SOIL CONSERVATION

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134

Index

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SOIL CONSERVATION SERVICE

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SOIL CONSERVATION

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SECRETARY OF AGRICULTURE

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OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

WELLINGTON BRINK
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 29, 1954. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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OUR SOIL ★ OUR STRENGTH

TREES HELP COTTON.—Frank Babek, Willow, Okla., finds that windbreaks return a profit of more than $50 per bale on his cotton crop. The windbreaks yield more profit than the price of the land by protecting the soil from erosion and by moderating sudden temperature changes.

As head of the Greer County Cotton Growers Association, he has made a study of cotton crops and windbreaks and notes that his farm and neighboring farms with good shelterbelts like his have a cleaner and whiter class of cotton, which grades higher and brings an increased price. The belts protect the cottonfields from shifting sands that dirty the cotton in open fields and from the high winds which frequent the area.

—JAMES B. MCBRIDE

FRONT COVER.—This photo montage includes examples of farm woodlands throughout the country: upper left, second-growth pine in Southeast; top center, Douglas-fir reproduction in Northwest; upper right, farmstead windbreaks in Great Plains; lower left, maple sugar season in the Northeast; lower right, typical of hardwoods growth in the Lake States.

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Preface to this special issue on

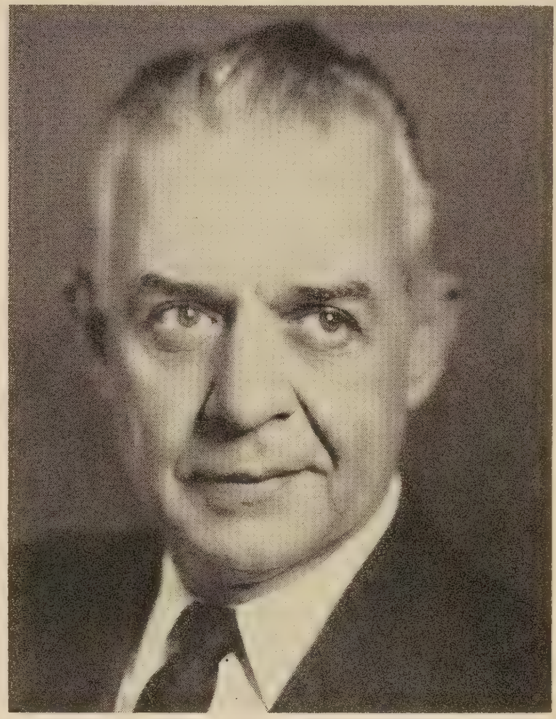
Woodland Conservation

By T. B. PLAIR
Head Woodland Conservationist
Soil Conservation Service

AS we use the term in the Soil Conservation Service, "woodland conservation" is the art and science of assisting landowners and operators to use land within its capabilities for wood production, as a part of an integrated program of soil, water, and plant conservation. This signifies, first, protection of land against soil depletion. It further signifies increasing yields, improving the wood crop, conserving water for use, and adding to the cash income of the landowner. It means a betterment of our national welfare through efficient, abundant production on a sustained basis.

The $4\frac{1}{4}$ million woodland owners could say: "America, we hold in our hand the productive potential for nine-tenths of your wood supply. We produced it in 1952, and we can grow much more for you than we did that year. Our woodlands are protecting your water supply by receiving it, storing it, processing it, and making a delayed delivery to you. We know that our woodlands have helped you with your recreation. You must also have admired their beauty. We believe that you want us to keep them green, keep them growing, and keep the wood rolling. We think you will help us do this by admiring them, protecting, and using their products."

It was a little more than 20 years ago that the Soil Conservation Service started working with landowners and operators on a coordinated approach to using their soil, water, and plant resources. At that time, in many quarters, the woodlot was synonymous with privately-owned forest lands. In Government publications of that time such statements as this appeared: "The woodlot is a good place for the farmer to use his spare time cutting fence posts and fuel for home use."



Mr. Plair

In those days millions of trees were being planted just to plug gullies or stop soil movement. There were no plans for those trees beyond that. But yesterday an eminent forester who has traveled around the world said: "You know, there has been a new birth in American forestry during the last 20 years. It is no longer just Federal land ownership and fire protection. Today there are $4\frac{1}{4}$ million landowners involved, and the job is primarily theirs."

If we examine our progress day by day it is sometimes discouraging. Yet when we look back over the past 20 years, we discover that we now have many aids to help us in woodland conservation that we did not have then. In the Soil Conservation Service we had just started the integration of technologies to get the coordinated approach in land use planning. At the outset specialists in engineering, soils,

agronomy, forestry, and biology had too little in common to work effectively as a team. Today we have soil scientists helping evaluate the productive potential of land for growing tree crops; engineers helping to get water level stabilization in woodlands; range conservationists helping determine livestock carrying capacities for woodland range, biologists working out forest-wildlife relationships, and others contributing in various ways. Federal and State Governments are furnishing specialized services in forest management and utilization. Private forest industries, both large and small, are directing much of their work to helping make private woodlands more productive.

There is no other single crop that gives us in the Soil Conservation Service any better opportunity to work with so many people. The total wood crop that can be grown on the hundreds of millions of acres of America's woodlands would be a tremendous increase over present production, and therein lies our great challenge.

By this special woodland conservation issue of SOIL CONSERVATION Magazine we want to give credit to all technicians who have helped bring about the birth of new emphasis on woodland conservation. You should derive much satisfaction from helping landowners and operators make their woodlands produce more Green Gold.

Small Woodlands Add Up to Big Business

By ARTHUR R. SPILLERS

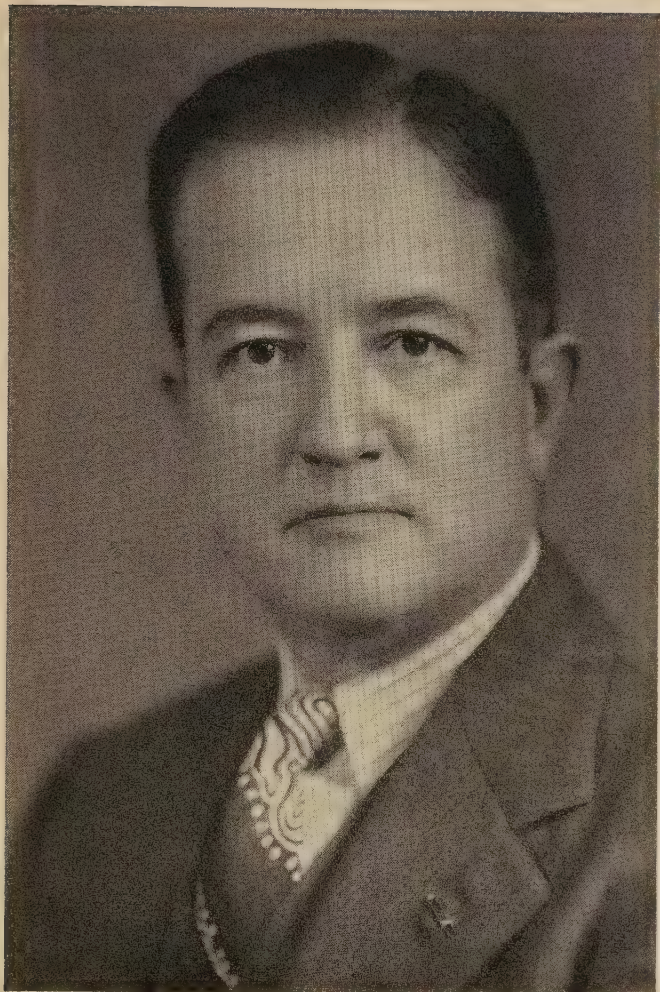
DID you know that our wood crop occupies more land on farms than any other crop? We have known for a long time that the farm forests and other small woodlands had an important place in this country's overall forest picture. But not until after World War II did we learn just how important these small woodlands were. From the reappraisal of the Nation's forest resources that the Forest Service made shortly after the war ended we learned that actually three-fourths of all the private commercial forest land in the United States was in small forests (holdings of less than 5,000 acres). This country's commercial forest land area is nearly 460 million acres. About 116 million acres of this is in national forests and other public forests, Federal, State, county, and municipal. Over 343 million acres is in private ownership. Of the commercial forest land privately held less than one-fourth is in industrial or other larger classes of holdings. Three-fourths—some 260 million acres—is in small woodlands. These small woodland properties average 62 acres each.

Commercial forest land means land that is growing commercially valuable timber crops, or is potentially capable of growing them. Nearly 140 million acres of this commercial forest land is in farms. And there is another 120 million acres of small woodland holdings in rural areas that are not parts of operating farms—small country estates, and tracts held by local businessmen, investors, widows, retired workers, and nonfarm owners.

"There is no other land use or crop which directly affects the welfare of more landowners," said T. B. Plair, woodland conservationist of the Soil Conservation Service, at a recent meeting of the Association of Southern Agricultural Workers.

Small woodland holdings are held by 3¼ million farmers and 1 million non-farm owners. These farm woodlands and other small woodlands are generally the most accessible forest land with respect to transportation and industrial markets. Generally, too, they occupy bet-

Note.—The author is chief, division of cooperative forest management, U. S. Forest Service, Washington, D. C.



Mr. Spillers

ter than average timber-growing sites. They are supplying a substantial part—probably more than two-thirds—of the wood products we use in this country today.

The woodland acreage in farms and other small holdings also exerts a marked effect on the extent and character of runoff and on the conservation of soil and water. Occupying usually the rougher and often the higher portions of farms, they can be a potential source of damaging floodwaters or a source of useful water supplies. When they are adequately protected from fires and from the compacting effects of too much livestock grazing, when their timber is harvested by methods that maintain the ground litter and the soil porosity, the woodlands are capable of absorbing and storing much of the water that comes as rain or snow. Woodlands in good condition can help a great deal toward effective natural control of accelerated runoff and the associated movements of sediment and debris.

National Forests administered by the Forest Service protect some of the key mountain watershed areas—the headwaters of many of our major streams, the source of water to supply hundreds of cities and towns, power plants and industries, and to irrigate millions of acres of farmland.

But many local small woodland areas can also provide clean, well-distributed waterflows for farm irrigation. The rapid spread of supplemental irrigation in the humid East and in the coastal portions of the Western States has already imposed severe strains on locally available water supplies. The time is not far off when farmers will take a new look at their wooded areas. Our watershed management research is constantly developing methods of reducing wasteful runoff and increasing the yield of usable water from woodland areas. As the results of this research become better known, I am sure that in many localities farmers will accept water conservation practices on their woodlands as a profitable part of the farm business.

A large number of small woodlands are in rundown condition. Owners have let them be heavily overcut; they have been burned over; young trees have been destroyed or damaged and the soil packed hard by overgrazing. Many absentee owners have permitted their woodlands to suffer both in productivity and in water conservation potentialities as a result of mismanagement and neglect. The woodlands, farm and nonfarm, need careful handling to build up the growing stock. With such building up and with good management, the small woodlands of this country, I believe, could in the long run produce three times the amount of quality timber they do now.

The public forests and many large industrial forest holdings are managed by professionally trained foresters. But very few of the small woodlands have had the benefit of technical forestry assistance.

The Department of Agriculture and the States are working in a number of ways to provide increased aid on forestry matters for small woodland owners. The Department cooperates with the State agricultural colleges in

forestry extension work. The Soil Conservation Service encourages tree planting and other forest restoration and improvement work, and good forest management. Farm forestry was given a boost by the Agricultural Conservation Program. The Department of Agriculture cooperates with State forestry departments in a program for the production and distribution of trees at low cost for woodland and shelterbelt planting.

Individual, on-the-ground help is important. Each tract of woodland is different as to condition, kinds of trees, topography. The problems of one owner differ from those of another. No one has ever devised a simple set of rules or practices that will work either for all woodlands or for all owners.

A cooperative program to provide on-the-ground technical assistance is conducted under the Cooperative Forest Management Act of 1950. Although the Act makes no limitation as to classes or sizes of owners, the work is conducted primarily for the benefit of the small woodland owners. The Act also provides for technical aid to processors of primarily forest products.

At the present time there are 274 foresters in the Cooperative Forest Management Program. These men are employed by the State Foresters. The Forest Service cooperates in training and inspection, and provides a part of the funds. Last year these foresters were able to reach 32,224 woodland owners. They are particularly happy to work with soil conservation districts and with farmers who have a farm plan, for under these conditions much of the preliminary work has been done by the Soil Conservation Service. The owner is already aware of the value of good woodland management. A forester can go into the woodland with an owner who has requested assistance and get right to work.

I am sure that I can speak for many of the State Foresters as well as for the Forest Service when I say thanks to the Soil Conservation Service and to the soil conservation districts for the help they are giving our foresters. And I know that the individual landowners also appreciate this help.

Nearly every small woodland can benefit by the application of some technical forestry. Most small sawmills and other wood processing plants also can use some technical help. So there is much to do. To provide technical assistance to 4¼ million woodland owners and more than 50,000 small wood processors is a stupendous task.

Money From Your Trees

By FRANKLIN BRADFORD

THERE'S gold in that little patch of woods over on the back forty!

Interest in tree farming—the growing of timber as a crop—is gaining throughout the country. Thirty-six states now have active Tree Farm programs under the American Tree Farm System. The system added more than three and a half million acres of woodlands last year.

Behind this increasing fervor for forestry lies the basic stimulant of good markets. Unless the farmer can sell his saw logs, his fence posts and his Christmas trees, he has little incentive to investigate woodlot management. For geographical reasons, there isn't always a local market for timber, yet the overall market outlook is bright.

Wood is already going into more than 6,000 items which affect our daily lives, and the technological experts tell us we are only beginning. The chemist's test tube holds the answer to many new uses for wood.

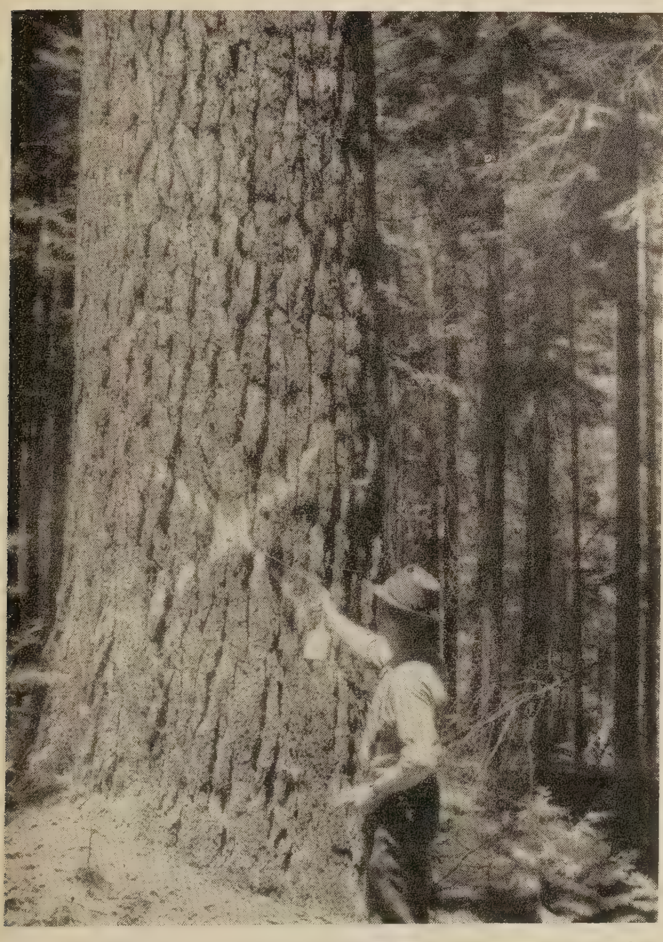
There are some 4¼ million "small" landowners in the nation today. They hold 57 percent of the country's forest land, and each year sell 700 million dollars worth of saw logs, pulp-

Note.—The author is assistant editorial director, American Forest Products Industries, Washington, D. C.

wood, posts, turpentine, Christmas trees, maple syrup, and other forest products.

Because these small landowners control most of the nation's commercial forest land, it is clear that increasing demands for wood open the door to greater opportunities for producing timber as a cash crop. The farmer who has paid little or no attention to his woodlot might well look into the advantages of forest management.

As stated, tree farming simply means growing timber as a crop. The American Tree Farm System is an industry-sponsored program through which good forest management is publicly recognized. When a landowner feels that he is managing his woodlot wisely, he may apply to his state Tree Farm committee, which will arrange to have the woodlot inspected. If the inspection by a recognized forester shows management measures up to principles of the American Tree Farm System,



This mature sugar pine is marked by paint gun for harvest. Note trees of varying ages in background. This tract is managed to provide continuing crops of trees. (Photo from Western Pine Association)

Mrs. Fred Gowdy, daughter of Frank Bennett, consulting forester in Baton Rouge, La. Bennett owns a 640-acre Tree Farm at Norwood, La., part of some 1,200 acres there in a pine Tree Farm.

the landowner gets a certificate, also a Tree Farm sign which he may display on the land.

Whether a landowner joins the American Tree Farm System or not, he may reap cash benefits from a well-managed woodlot. If he applies for Tree Farm certification and gets it, his woodlot then simply wears the "tag" "Tree Farm" and stands as an example to others. This way the tree farmer is encouraging other landowners to grow trees as a crop.

Under principles of the American Tree Farm System, the landowner must protect his woodland from fire, insects, and excessive grazing. He must harvest timber in a manner to insure continuous crops.

The American Tree Farm System is administered by American Forest Products Industries, 1816 N Street, N.W., Washington 6, D. C. Industry committees administer it in the various states. Those who desire information about the Tree Farm program in a given state may write AFPI in Washington. There is no membership fee or dues. To retain his certified status, the landowner must maintain good management of his woodlot. This is determined by periodic inspections.

The landowner who has never sold timber might begin by discussing his problem with a trained forester, one of some 15,000 in the country. The forester can cruise the

timber and determine steps needed for sound management. There's a good chance that the woodlot needs an immediate thinning. This means that diseased and crooked trees may be removed and marketed. Not only will this provide income for the farmer, but it gives the sounder trees more "growing room." The growth of these remaining trees is much faster than before the thinning.

As times goes on, the farmer may select mature trees for cutting, or he may cut others for pulpwood, fence posts, fuelwood, or general farm use. Once his "stock" trees have been established, he can figure on periodic harvests based on selective cutting.

Keeping fire out of the woods is of paramount importance. Years of careful management can go up in smoke if the farmer doesn't take every precaution against this No. 1 enemy.

Some of the industries have their own Tree Farm "families." Under the "family" plan, an industry, such as a sawmill, provides free forest management services to a large number of smaller landowners in return for which the landowners may give the company first shot at buying the timber when it is mature. Some of the "family" plans are no less than gentlemen's agreements. To the non-resident landowner, the plan has many advantages. To date there are relatively few industries using the family plan, but those who are find it highly successful. It is a step toward stabilizing their future timber supply without the necessity of heavy land-buying programs.

Tree farming is basic to an overall land use program. Multiple land use is an inherent part of tree farming as practiced under the principles of the Tree Farm system. It means food and cover for wildlife. It means recreation spots, better fishing, and hunting. And it means better watersheds for lakes and streams.

A State's Role in Tree Farming

By C. H. COULTER

FLORIDA, long known for bathing beauties, citrus, and cattle, also is a leader in the farm forestry program.

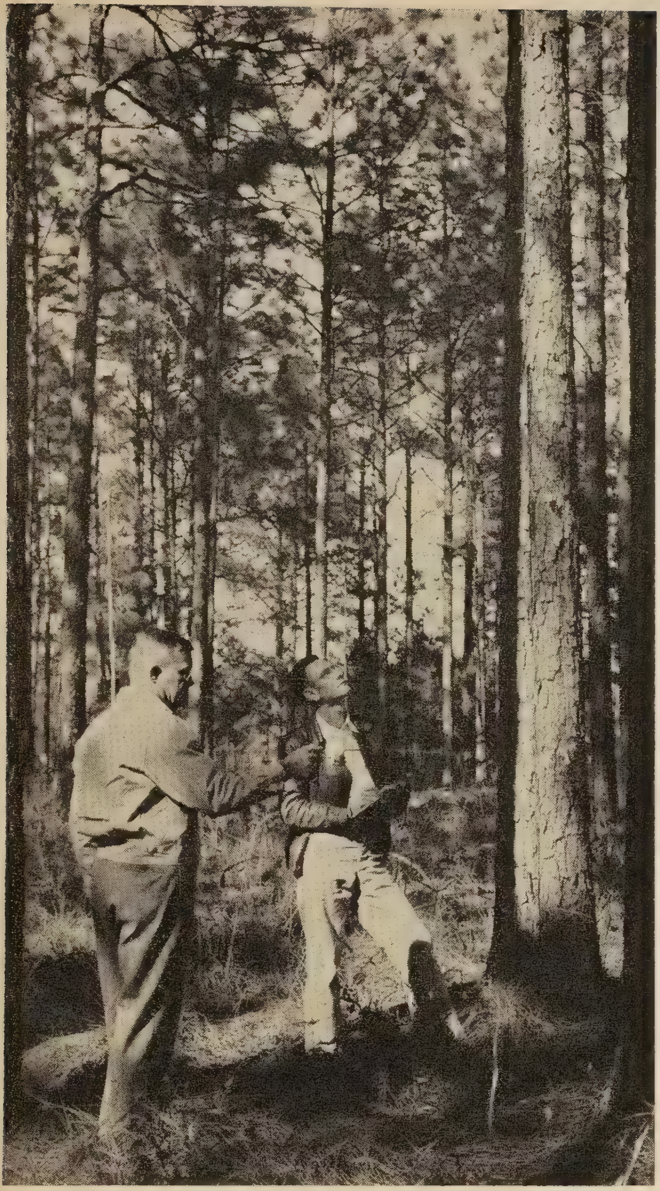
Some 44 states, including Florida, have forestry departments to help conserve and utilize their woodlands. Forest fire control is well advanced. Growth and distribution of seedlings for reforestation has been going on for years, with a tremendous increase in the last decade. Cooperative forest management is the newest constructive activity. Management assistance for small-woodland owners is favorably affecting their pocketbooks and putting their woods in better shape for the future.

The Florida Board of Forestry, charged by law to conduct any work necessary to protect and build up the forest resources of the State, initiated the farm forestry program in 1940, with two projects involving five counties. This was in cooperation with the U. S. Soil Conservation Service and the U. S. Forest Service. In the piney woods and swamps, education and assistance to private woodland owners by experienced professional foresters (commonly called farm or county foresters) has grown as a result of public demand, so that today the Florida Forest Service employs 14 such men to work in 32 counties.

In Florida an individual county or a group of counties, depending upon timberland acreage and ownership, contracts with the Florida Board of Forestry to share the cost of a farm forestry project on a 40-60 basis. Much of the credit for the continuing expansion of this program is due soil conservation districts and employees of the Soil Conservation Service. The districts, through their cooperators, frequently have led in the establishment of new projects.

In order to carry on a complete and effective program of soil, water, forest, and wildlife conservation, with a minimum of duplicated effort, the Florida Forest Service and Soil Conservation Districts have entered into memoranda of understanding.

Note.—The author is state forester, Florida Board of Forestry, Tallahassee, Fla.



Marking and estimating is important. As a team, the farm forester selects and tallies while the farmer marks the trees to be cut.

As a result of cooperation, farm foresters are often in attendance at district meetings. They prepare the woodland phase of the farm plan and operate and schedule district forestry equipment, in addition to providing direct technical assistance to district cooperators.

Reforestation of 4 million acres of land best adapted for timber crops is necessary to build Florida's forest resource. Though the State's nursery production of pine seedlings has risen to 50 million, the demand for seedlings still has not been met. As a result, during the past 2 years many large seedling orders had to be reduced 40 percent to afford equitable distribution. However, orders from small private woodland owners requesting 25,000 seedlings or less were filled without reduction.

A typical small-planting cooperator is likely to order his seedlings through the local district office. He may also rent a district-owned mechanical tree planter for a small charge. At planting time, the farm forester likely will deliver the machine, instruct the cooperator how to plant pines, and later return to collect the rental fee.

Over 40 percent of the State's 20 million acres of forest land is owned by 55,000 farmers and other small forest landowners. The rest, being in large industrial holdings or public

Farm forester demonstrating to landowner the proper application of chemicals used to poison undesirable species.

Farm Forester Garland points out the merits of spiral gutters and double-headed nails to J. Q. Agner.

Tree-planting machine owned by Jefferson (Fla.) Soil Conservation District being demonstrated by Farm Forester Herndon and Claude Groom, technician aid.

agencies, is generally being protected and managed for continuous production.

Much of the wood to sustain and increase the production of Florida's $323 million wood-using industry must come from the smaller woodland holdings. On-the-ground education and assistance in proper land use and forest management is essential. Industrial and consulting foresters will continue to contribute to the accomplishment of the job. But for years to come the Federal, State and county governments must continue to lead the way, through the farm forestry program.

Requests from woodland owners for assistance by the farm forester are received from various sources; but principally through SCS technicians, county agents, district supervisors, industrial and consulting foresters, loggers, and other members of the wood-using industries.

Before contacting the owner, the farm forester generally studies the land capability map and farm plan. Accompanied by the owner, or his representative, he makes a complete on-the-ground study. All information pertinent to proper woodland planning is obtained, including site capability, degree and type of stocking, growth rate, protection measures, and merchantability.

Complete recommendations are provided the owner. They include a description of the silviculture, management, protection, and marketing measures necessary to assure maximum and continuous forest production. The recommendations, accompanied by a woodland map, are designed for inclusion in the cooperator's conservation plan. They are aimed at attaining the best possible forest-management practices and are tempered to suit the owner's economic status and yet improve the woodland.

In order to insure getting the right start on these practices, farm foresters may spend up to 3 days assisting the owner on such activities as poisoning undesirable species, tree planting, control burning, and marking and estimating timber for harvest.

Frequently an owner's prime motive in obtaining the services of the farm forester is to obtain assistance in marketing timber. Recently a Gadsden County farmer with a 14-acre woodlot requested such assistance and stated that a local sawmill operator had offered $500 for all the timber. The woodland contained two types of longleaf pine—one area of mature trees already worked-out for turpentine purposes with a scattering of reproduction, and another area of dense stand of 6-inch to 10-inch trees. It also included a small area of loblolly

pine, with considerable canker disease, along a small creek or drain.

Farm Forester Herndon, assisted by the owner, marked and estimated for a thinning of the loblolly and young longleaf. The mature longleaf stand was designated for a seed tree cut. Herndon's estimate of the sawtimber to be harvested was 36,000 board feet, which the owner sold as stumpage in a lump sum to the highest bidder for $1,260. Following the saw log operation, approximately 36 cords of pulpwood were marked and sold for $216.

After cutting was complete, the area was control-burned for control of brown-spot disease and to facilitate establishment of reproduction.

This owner, while realizing a return of over $105 per acre, improved the condition of the stand, which will require another thinning in 6 to 8 years.

With Florida the nation's second largest producer of gum naval stores, the farm foresters encourage small woodland owners to include gum farming in their woodland management.

J. Q. Agner, Madison County farmer, contacted Farm Forester Wyman Garland several years ago regarding marketing some longleaf timber. After studying the timber stands, Wyman suggested delaying the thinning for 6 to 8 years to obtain maximum growth. However, he encouraged and taught Agner to gum-farm by selective cupping. Using the most modern means, including acid treatment, bark chipping, double-headed nails, and 2-quart cups, Agner has worked 2,000 faces for the past 2 years. In this time, gum-farming has yielded a net income of $1,140, or $0.285 per face per year. After 6 years, with normal increased growth, these worked-out trees will be harvested for higher yielding products such as poles or saw logs. Then, Agner's woodlot will permit selective cupping of several thousand more faces—thus, a continuous operation.

Because effective forest fire control is essential to forest management, the Florida legislature in 1935 passed a law providing for county forest fire protection. Under it, the State and individual counties contribute to the support of the county fire control organization, which is supervised by the Florida Forest Service.

Land under forest fire protection has increased gradually so that at the present time 70 percent of the privately owned forest land is protected from fire. In 1953-54 only 1.3 percent of Florida's protected land burned, while 43 to 57 percent of the unprotected land burns each year.

In 1952 Florida's consumption of forest products amounted to 3,698,000 cords with a wholesale manufactured value of $323,161,000. By 1970, with the increased demand for wood and wood products, tree farmers, large and small, will be called upon to produce an additional 1,800,000 cords annually to supply a $600 million forest industry. To achieve this goal, they will need to practice proper forest management and protection, and to call on all private and public foresters to provide technical knowledge and assistance.

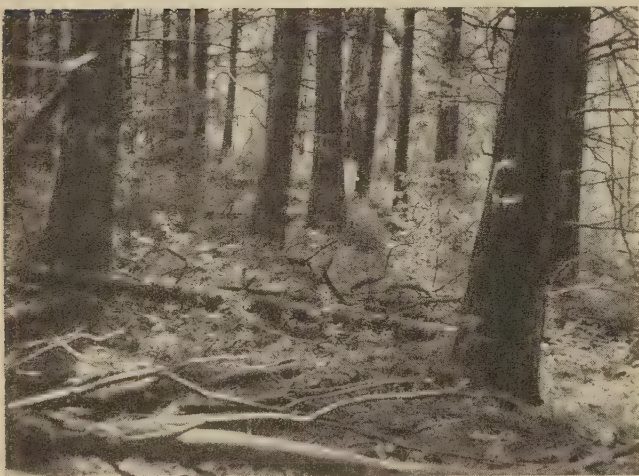
Jackson and trees.

ONE-ACRE RECORD.—W. R. Jackson, a negro farmer, of Bienville Parish, La., in 1941 pulled up 1,000 native loblolly pine seedlings and planted them on one acre of his idle land. Trees on this acre were marked for cutting in 1953. The D-plus-6 spacing rule was followed in marking for harvesting. Jackson cut the marked trees and harvested 6 cords of pulpwood for which he received $51. There were about 12 cords left in trees not removed. These remaining trees were the best and of highest quality. They should increase 2 inches in diameter and be ready for another thinning in 1959.

—Ford Fallin

MORE TO COME.—Space limitations precluded the use of certain articles in this special issue. This material, helping to round out the farm woodland story, will appear in future months.

Woodland Conservation in the Districts



Second-growth ponderosa pine marked for an improvement cutting. Trees painted with a "C" are to be harvested.

West

IT is no longer a problem to get farmers and landowners in the Western States to cut in their woodlands. The greater problem is to help these same owners to follow good woodland management practices which keep their lands productive.

The good outlets for wood products have accelerated the demands for raw material from private lands in the West. Many new wood-utilization plants have been put in operation, and utilization methods have greatly improved. These factors offer many advantages which facilitate an improved woodland conservation program. These same factors do, however, create difficulties in getting farmers to follow sound woodland practices. It is hoped that these problems are temporary in nature and that landowners will come to realize the value of their woodland crop and the necessity of following practices that will result in continuous tree crop production.

Slow but steady progress is being made. Since 1939 the Soil Conservation Service has written 20,000 plans with soil conservation district cooperators in the Western States. These plans contain technical recommendations covering correct woodland conservation practices. The Service has assisted in the planting of 30,000 acres of trees in these Western States. Technical assistance in the application of these practices has been rendered on approximately 1 million acres of woodlands consisting mostly of second-growth stands.

The first two bank loans under the Forest Credit Law were made in 1954 on farms on which the SCS had helped the landowners to make woodland plans.

Since 1946 the Service has carried on soils-forest site correlation studies. The first few years the studies were confined to the Douglas-fir region. In 1952 the studies were expanded to the yellow pine areas. These are the first studies of this type in the West. As a result of these studies the Service is able to improve greatly its technical recommendations for improved woodland conservation practices.

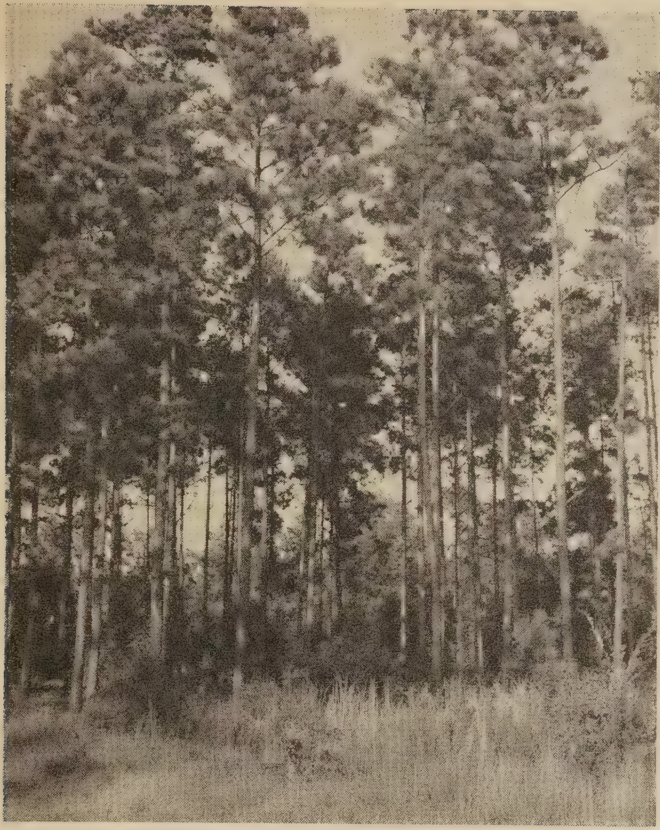
The planting of field windbreaks and shelterbelts has slowed down considerably in the last few years. This is partly due to the lack of labor on the farms and partly to the difficulty of obtaining suitable and sufficient planting stock. It has become increasingly difficult to obtain planting stock in some states and to obtain a variety of stock in all the states. This condition has caused Service technicians to moderate its emphasis on this phase of the woodland program. In a few states where the game habitat division of a State fish and game department is entering into cooperative agreement with Soil Conservation Districts, the planting of field windbreaks is increasing.

In the Western States over 50 percent of the total land area is in forests. The ownership of the forested lands is varied and intermingled between Federal, State, large company, large private, and small private holdings. The majority of the second-growth holdings are under private, often small, ownerships. The vegetative cover on such lands ranges from one species to a wide variety of species in complex relationships. Due to old methods of cutting and past management practices, these second-growth stands are in various degrees of stocking and occupied by brush and inferior species. In the dual-use forested areas, lands are still largely considered for their range value and not for their timber value. Old customs and habits of burning the woody vegetation to convert the woodlands to grasslands are still followed in many areas. These are but a few of the land use problems that the Service shares responsibilities for in carrying out the woodland phase of soil conservation in the West.

—Orlo W. Krauter

Southeast

THE Southeastern States, from North Carolina to Texas, include all but some fringe areas of the important southern pine belt. Here are produced 30 percent of the lumber and 60 percent of the pulpwood for the entire country. More than half of the land is woodland. No wonder that getting woodland into condition for high production and keeping it that way is of prime concern to soil conservation districts throughout the Southeast!



Here timber was marked and selective cut made for pulpwood in 1940. In 1945 a selective cut for saw logs was made. Regular returns have resulted netting more than $7 per acre per year since 1939.

About one-third of the woodland is owned by big lumber and paper interests. Most of these have their own staffs of foresters and are doing a very satisfactory job of protection, reforestation, and timber management.

Not so with the owners of the other two-thirds of the woodland. These are farmers, doctors, lawyers, merchants, ranchers, and other "little" investors who own a few acres or a few thousand acres with the hope that some day it will pay off. They don't, for the most part, know quite what to do to hasten the payoff. It is surprising how many of them are eager to learn.

These smaller woodland owners (more than 99 percent of all owners) are the woodland problem in the Southeast. The woodlands themselves present no insurmountable problems.

How to reach people with a woodland program they could understand and practice was the big question which the Soil Conservation Service had to answer or give up its ideal of coordinated land use.

Forestry techniques usually had been designed for application by professional foresters. The thinking of the smaller woodland owner required a translation of technical language into terms he could understand. He is accustomed to handling his own operations with livestock and field crops and, with rare exceptions, does not see why he cannot do the same with his woodlands. The alternatives were to help owners manage their own woodlands or see all but the exceptional jobs go undone.

The Soil Conservation Service chose to help. It came up with prescriptions simplified as to language but sound technically. The program, which has met with wide success, is as follows:

1. *Protect woodlands from destructive burning and from destructive grazing.* The Soil Conservation Service recognizes certain advantages of both controlled burning and controlled grazing. Uncontrolled burning is still so prevalent, however, that the advisability of controlled use of fire is a question to be weighed most carefully.
2. *Plant seedlings of adapted species* on areas that are not likely to become stocked naturally within a reasonable time. This includes planting of open fields and scrub areas that are remote from seed trees of desirable species, and occasional windbreaks.
3. *Thin* dense stands of commercial trees, taking out the worst, to give the remaining trees space to grow for a short period of years.
4. *Harvest crop trees* at a rate designed to allow time for them to attain sawlog sizes. This is done by counting the trees themselves, and they are taken in groups large enough to leave adequate space for a new generation of trees to start.
5. *Salvage* merchantable trees that are dead or dying, or hopelessly damaged by fire or storm.
6. *Release* desirable seedlings that are overtopped by culls, by girdling, poisoning, cutting, or otherwise deadening the culls.
7. In addition, an attempt is made to divide the woodland into the number of fields required to give the owner a chance to operate one field each year. This tends to equalize the farm labor requirements, equalize annual income, and minimize taxes. By working in the woods every year, the owner keeps his hand in and can improve operations through experience, whereas if he cuts timber only every 20 years or so he tends to forget how to do the job.

So much for the treatment of the woods itself. This approach has been used long enough to prove that any woodland owner *can* do a satisfactory job of managing his own woods. The number who are eager to learn exceeds the facilities available for teaching them.

One of the most heartening things is the willingness of so many people and organizations to cooperate with district supervisors in meeting the needs of the land for woodland treatments. There are many examples of state forestry organizations, extension foresters, bankers, merchants, newspapers, wood using industries, schools, and public spirited citizens in every walk of life who pitch in and give freely of time and money to advance the productive use of woodland areas. Without their help the districts could not possibly show such excellent results in the planning and treatment of woodlands. —H. C. MITCHELL

Northwest corner of 20-acre field in Burt County, Nebr., which is completely enclosed by windbreaks.

Great Plains

FARMERS and ranchers in soil conservation districts in the Great Plains are working in their woodlands and planting trees in ever-increasing numbers.

For example, western Montana soil conservation district cooperators are a part of a huge Christmas tree industry which has recently developed in that area. They are also harvesting greater quantities of saw logs, posts, and poles. Income from these sources is steadily increasing and contributes materially to the economy of the region. Portable sawmills and chain saws are a great aid in the orderly harvesting of wood products.

Woodland areas in the Rocky Mountain States are famed for their multiple-use and have high watershed values. Here, too, Soil Conservation Service technicians are working with other agencies and with private woodland owners to develop interest and appreciation of trees, and to assist cooperators in the use and conservation management of their woodland acres. As the country's economy grows and timber supplies decrease, increasing uses will be found for woodland products in these areas.

The same is true in Wyoming's Big Horn country and in the Black Hills, where Calvin Coolidge once cast for the wily trout. What would these mountains and hills be like without their protective mantle of verdant pine? Our nation's soil conservation districts are helping to preserve this great resource for future generations.

From the eastern foothills of the northern and southern Rocky Mountains to the panhandle country of Texas and Oklahoma, and north and east across the rolling prairies of Kansas, Nebraska, and the Dakotas, there lies a vast rich ranching and farming area—the Great Plains—where the climate is rigorous and, at times, severe. Tree growth is sparse. Early settlers planted trees for protection against winds and snow, and this practice has continued to the present day. Soil conservation district supervisors here are recommending windbreak plantings as a conservation practice in 580 soil conservation districts, designed to protect soil, crops, livestock, farmsteads, and wildlife. It is one of the most useful and popular practices in the Great Plains. District-operated mechanical tree planters have contributed largely to the acceleration and success of this work.

Along the eastern fringes of Texas and Oklahoma, an increasing number of people are turning to the use of land for the production of posts, poles, pulpwood, and saw logs. Woodlands once considered worthless are proving highly profitable. Annual net returns of $12 to $15 per acre are not uncommon.

Soil conservation district supervisors and cooperators everywhere in this vast 10-state area are showing wisdom in long-range planning of land use and in the management of all the land—including woodlands.

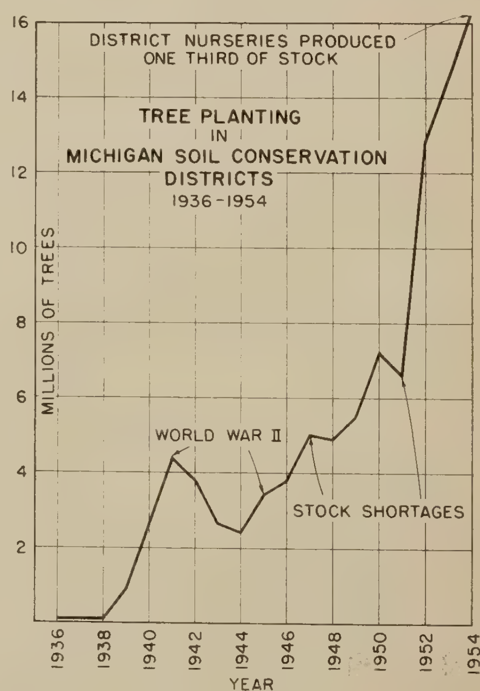
—A. E. Ferber

North Central

DOMESTIC livestock is the greatest single source of damage to hardwood timber in the Upper Mississippi Valley States. Neither fire, insects, nor disease are so destructive. The last Census of Agriculture, however, discloses that woodland grazing is on the decrease. Using land within its capabilities and the development of better pasture and feeding methods have resulted in the removal of livestock from 3 million acres of woodland in the 15-year period prior to 1950.

Farm planners in soil conservation districts have had much to do with this favorable trend because they have emphasized two money-saving facts: (1) good livestock deserves better feed than can be found in woodland, and (2) it is less expensive to maintain a fence around 4 acres of improved pasture than 40 acres of pastured woodland. Yet both have the same carrying capacity.

Tree planting, too, has made progress. Here again the land capability concept has played an important role. Class VII land means permanent vegetation; in the humid sections of the country it means trees. Constant repetition of this simple fact has brought some phenomenal results in states like Michigan where co-



operators in soil conservation districts are now planting 15 to 16 million trees every year.

These trees are not gifts. They are purchased by landowners. In Michigan about one-third come from nurseries owned and operated by the directors of districts. As one farm planner put it, this is "tree-roots democracy."

Woodland improvement as an accepted practice on farmland also is taking hold. New developments in tree-killing chemicals and tools for girdling have made possible easier and more acceptable means of removing weed and cull trees, thus releasing valuable reproduction from competition and providing a thinning for rapid growth.

Directors in a few districts which have large areas of woodland needing improvement, have purchased gas-powered girdling machines for rental to cooperators. These machines quickly expose a band of sapwood around large cull trees, after which the exposed wood is treated with a solution of either 2,4,5-T or Ammate.

The simple but fundamental woodland practices which have been installed on farms in districts came about as an expression of a philosophy by a former SCS woodland conservationist, John F. Preston. Years ago, as head of what was then the forestry division in Washington, and supported by his Chief, Hugh H. Bennett, Preston said: "The first and most important jobs to be done in farm woodlands are farm jobs, not forestry jobs. If the work is to be done, the farmer will do it in the same way he handles agronomic and other conservation practices. Specialists are needed in various technical fields, but mostly they are in the background, and their technologies are funneled through a single man—a farm planner. The planner integrates all into a workable conservation plan, and guides the landowner toward a coordinated program of accomplishment."

—Stanley S. Locke

Northeast

TIMBER-R-R! This is the alarm call of the logger, echoed first in northeastern woodlands. It foretold the harvesting of another tree. As echoes are absorbed by time and space, so too were the tree crops within the northeastern region. To build cities and meet the demands of an expanding industrial empire the first settler, even as today's farmers, provided trees to be converted into products needed by a society restlessly seeking goals that demanded the exploiting of natural resources. Gone is the pristine tree wealth we once knew; remaining are millions of acres of wooded land, potentially productive, awaiting the attention of business- and conservation-minded owners. The production of merchantable tree products can be more than doubled if the farming of woodland acres receives attention comparable to that directed to grassland and plowland.

More than a third of the farmland in the Northeastern States is growing trees. Eighty percent of these acres, because of their topography and soils, are best suited to the continued growing of tree crops. The productive maintenance of 20 million acres of woodlots lends balance to our agricultural economy and will provide many social returns, not the least of which is their influence on wildlife.

Technician and landowner determine which trees are to be harvested.

To what extent farmers and others are managing their wooded land is a moot question. Accepted standards are lacking. It is known, however, that through ignorance or indifference, capital values, as represented by sound, straight trees of valuable species, have been greatly reduced. Historically, farmers and loggers have "taken the best and left the worst." Culls—the unwanted trees—remain. Conservation management seeks first the removal of these unmerchantable stems.

It can be noted that the informational programs of various agencies, directed at farmers and other woodland owners, are stressing to good effect the fact that trees are a crop and respond to selective management just as do other crops. Farmers are beginning to understand that conservation methods applied to their tree crops are comparable to the management of their dairy herds—they weed out the low producers (culls and runts) and retain the high producers.

The onsite, direct and personal relationships of technicians and landowners that characterize the programs of soil conservation districts are in large part responsible for the increased acreage of woodland and increased tree-crop harvest values in the last 15 years.

From the Virginias to Maine, there is an increasing number of Tree Farmers. Continuing cooperative efforts of Federal, State, and private agencies will result in reestablishing capital values on an ever increasing acreage of woodland so as to supply our needs for products manufactured from tree crops.

—A. C. McIntyre

An Important Conservation "Tool"

By W. F. HALL

IN the soil conservation district program trees are more than producers of farm income, more than suppliers of raw materials to many industries, and more than a part of the natural beauty of the landscape.

Trees are among our best and most important conservation "tools."

In the upper reaches of our watersheds, forests with their green canopy above and their absorbent litter beneath are natural flood deterrents. Water trapped in the forest mat recharges ground water, and helps to keep streamflow dependable.

Like any other "tool" or piece of equipment, trees must be managed and maintained to be most effective.

Next to soil and high rainfall, trees are the greatest natural resource of the Southeast and other regions that can grow them well. Yet we were late in learning this important fact. We cut, burned, and cleared our forests shamefully. Much of our topsoil is in the oceans or above our dams, because we stripped off the woods cover that nature put on our steeper lands.

Why we abused our virgin forests and the soil that grew them, and who is to blame, is now beside the point. What really matters is that we now know how to manage and use wisely our remaining stands. We know how to restore trees on land that never should have been cleared. We're *doing* these things—not so fast as needed but at an increasing rate every year.

Of even greater importance to landowners and to the nation is the fact that we are doing this job within the framework of our democratic traditions. We who own and operate the land also own and operate the soil conservation districts that cover more than 9 of every 10 acres of farmland in the Southeast. Each of the 492 soil conservation districts in the Southeast has as its purpose the conservation and wise use of land and water resources, including land that is or should be in trees.

Of course, a farmer can plant or keep trees in fields safely suited for row cropping, if he desires. Or he can have forests on land that will grow grasses but not cultivated crops. But land too steep or too eroded for any combination of conservation measures except woodland use and management, must be in trees if the owner expects this land to be saved and to make money for him year after year.

Millions of acres in the Southeast will be safe from erosion and will stop creating flood and silt hazards only when in trees. These acres will never add appreciably to farm income until productive woodland again covers them.

These things I know from personal experience, as well as from observation. I'm in the lumber business. On various occasions I've been able to cut lumber off my own land to help me over hard times due to drought or other difficulties, to help absorb losses from the de-

On many farms the sale of saw logs adds to gross farm income. Using his own labor and equipment, a farmer drags logs to a truck-loading platform where a buyer will pick them up.

Note.—The author, a lumberman and farmer, is chairman of the Piedmont Soil Conservation District, a member of the Georgia State Soil Conservation Committee, and a director of the National Association of Soil Conservation Districts. His farm near Sparta, Ga., contains about 1,600 acres of wisely managed pine forest.

As salable trees are harvested young ones, well formed and of the right species, take their place. This is the basic rule for conservation management of tree crops and for maintaining woodland in a productive condition.

cline of cattle and other farm prices. Also, as a lumberman I've been able to buy timber from other farmers in need of supplemental income. The timber sometimes enabled these farmers to clear the mortgages from their lands, and in some extreme instances actually saved their homes for them. These timberlands were left in a growing productive condition. They were cut for sustained yield, were properly thinned, and were left with a good stand of young trees.

One of the best features of woodland, under good management, is that it is a rapidly renewable resource. It works 24 hours a day when assigned to replace crops formerly grown on land not safe in grass or row crops.

I actually have seen cases where farmers had lost everything except their land. They had to move away to other jobs, but continued to pay taxes on their farms. After a period of time, they found out that this was the best investment they could have made. The trees on their abandoned land grew into most profitable stands of pulpwood and saw timber. At the same time they increased the fertility of the land. The dividends would have been still larger, of course, had the tree stands had the benefit of personal management and protection.

Our soil conservation districts are encouraging our farmers to plant trees wherever trees will do best. The Soil Conservation Service helps us to make our soil conservation plans technically correct and sound, including proper methods of fire protection, planting, thinning, sustained-yield cutting, and marketing, in conjunction with the experience, research, and other help of State and Federal forest agencies.

We feel that our soil conservation districts have available the facilities and the will to give all our farmers whatever is necessary to succeed with forest management—one of the most important tools in proper land use.

Four Points on Cutting

Point 1.—*Thinning* to D-plus-6 spacing is illustrated on the farm of Karlton Kemp near Texarkana, Ark.

By H. C. MITCHELL and J. M. CASE

DURING the past 15 years a large number of southern farmers cooperating with their soil conservation districts have learned to increase their regular cash income by managing their own woodlands. Many now get annual income from their woodland just as regularly as from cultivated fields and pastures. On the average southern farm such integration of enterprises means, in effect, that they have increased their productive acres by some 50 percent.

One big reason for the steadily increasing acreage of owner-managed farm woods is the development of a tree cutting system that is technically sound, yet so simple that any woodland owner can learn to use it in a short time. It is a "four point cutting procedure" developed by Soil Conservation Service technicians as a solution to the problem of interpreting forestry techniques for layman use.

According to this procedure, there are four basic reasons for cutting a tree: (1) to thin or space the stand; (2) to salvage dead or dying trees; (3) to eliminate worthless weed trees, and (4) to harvest crop trees.

Any woodland owner can learn the underlying principles after a little coaching in the woods. As a part of the coaching, the owner is given some rules for guidance in marking trees to be cut, such as cutting the less desirable trees first, in order to build up the quality of his growing stock.

Salvage is, of course, the most obvious of the four reasons. Only a minor percentage of timber trees need to be salvaged but the item is not to be ignored in the business of making money from woodlands. Many merchantable trees are killed in the course of a year or damaged to the point where they make little or no growth and may die at any time. Insects, ice

Note.—The authors are woodland conservationists, Soil Conservation Service, at Athens, Ga., and Hope, Ark., respectively.

breakage, lightning, fire, disease, wind, and sometimes drought or flood all take their toll. In the course of a rotation of trees, some 50 to 75 years, such losses in any given stand of timber could make the difference between very attractive profits or mediocre ones if the salable trees are not salvaged.

Thinning of dense stands is simply to give the better trees "room to grow but none to waste." Over the life of a fully stocked stand of southern pine, about two-thirds of the merchantable volume is derived from thinnings, so this is a most important item in proper management.

Technicians have learned to define the correct spacing of southern timber as "D plus 6," wherein "D" is tree diameter and 6 is an added factor to give average distance in feet between trees. Thus trees 10 inches in diameter should average 16 feet apart; 15-inch trees should average 21 feet apart. Spacing in stands of trees in all timber types in the United States follows a D-plus-X formula. A few others, like eastern upland hardwoods, Lake States jack pine and western yellow pine could use the same D-plus-6 formula for thinning as is used in southern pine. The others mostly grow at closer spacings. The minimum spacing for dominant trees in any type can be determined from normal stand data published by the forest experiment stations. Simply divide 43560 by the number of trees at a given diameter (D). This gives the square feet of growing space required per tree. The square root of that figure gives the average spacing between trees in feet. Then subtract D and you have the value of X in the D-plus-X formula. Plotting many such figures on graph paper will show the species pattern. Another easy way to find the value of X is to plot numbers of trees per acre over diameter, draw in the average curve and proceed as above for average values read from the curve. When the value of X is established for full stocking of dominant trees, add 2 or whatever you like for spacing after thinning.

Thinnings are made at fixed intervals, usually from 5 to 10 years. The reason is a simple one, although not generally recognized. A given site has a certain capability for producing tree growth. The rate of tree growth, in turn, directly affects the number of years it takes for

Point 2.—*Release* of desirable young pine is effected by girdling cull hardwoods on the farm of J. W. Scales near Camden, Ark.

a timber stand to grow after a thinning until it needs thinning again. Although there is already a workable knowledge of the relationship between soil and tree growth, a survey by Soil Conservation Service technicians is being made throughout the South to reduce the subject to a scientific basis.

Without the D-plus-6 specification for thinning, the time interval between cuts would remain an indefinite figure, manageable by foresters using indirect methods but too vague and uncertain to form a basis for teaching the farmer how to go about the job of woodland cutting.

Release cutting is the removal of unmerchantable cull trees that are overtopping desirable young trees or seedlings. The worthless trees may be eliminated in a number of ways, such as girdling, cutting, or chemical treatment of foliage or stem. Girdling is most common, but chemical treatment is becoming more popular and holds great promise for the future.

The past practice of cutting only the better trees and leaving the culls to grow and produce seed has been a major factor in the deterioration of southern woodlands. Something like 9 of every 10 acres have a more or less acute weed tree problem, so the release cutting practice has wide application. Demonstrated by the forest experiment stations, its popularity has been enhanced by Soil Conservation Service technicians in many soil conservation districts.

The crop tree cut, as used by the Soil Conservation Service, is really the key to the workability of the so-called D-plus system. It not only controls the length of the rotation but in the many understocked woodlands it is the only commercial cutting that can be done. It works like this: (1) The technician makes a tentative decision as to how big a tree the soil will produce before growth falls off from old age; (2) then he calculates how many trees of that size there could be to the acre: $\frac{43560}{(D+6)^2}$; (3) from a table supplied to him, he finds about how old a tree of that size will be if grown with good management; and (4) in the last step, he calculates how many crop trees to cut per acre per year to come out even on the deal. This is simply $\frac{\text{No. of Trees}}{\text{Age}}$. For example, step 1 points to 22-inch trees; in step 2 he calculates

Point 3.—*Salvage* of wind-thrown trees is illustrated on the Smith Foster farm near Magnolia, Ark.

Point 4.—*Crop tree* harvest to create openings for reproduction is illustrated on the farm of Arl Hilderbrand, near Prescott, Ark.

that there are fifty-six 22-inch trees per acre; in step 3 he finds that the 22-inch tree is 56 years old; finally, he divides the number of trees, 56, by the age, also 56, and knows that if he takes his crop trees at the rate of one per acre per year, in addition to thinning, he will be in the business of growing 22-inch trees forever on that particular site.

The example sounds over-simple but the fact is no more complicated. When all the calculations for all soils are made, it has been found that taking crop trees at the same rate, one per acre per year, produces sawlog sizes on any commercial pine soil. The size of the crop tree varies from 17 inches on the poorest soil to 24 inches on the best. The answer of "one" is satisfactory everywhere, however, and the simplicity of the prescription is a real boon to those trying to teach a satisfactory brand of forest practice to the smaller woodland owners. The fact that the same prescription is applied to all soils does not mean that yields are the same from good and poor soils. Far from it. The range of potential yields is from 300 board feet per acre per year on the poor sites to 1,200 board feet on the best sites. The potential yield for average sites in the South is from 700 to 800 board feet.

Crop trees are taken in groups so as to create openings about 100 feet across. Such openings are needed for a new generation of trees to start. Eventually, trees of many ages and sizes are present, with just the right number getting ripe to harvest as crop trees at each cutting.

The smaller owners are the ones most in need of help. The larger ones have enough timberland to justify their own staffs of foresters. However, those who do their own woods work, just as they do the other farm jobs, are finding that the four point cutting program of the Soil Conservation Service gives them the help they need: (1) *thin,* (2) *salvage,* (3) *weed,* and (4) *harvest* crop trees by count. By dividing the woodlands into 5 to 10 compartments and working one each year, they derive the additional benefits of annual income, equalized labor load, and reduced income taxes.

COLD WEATHER CONSERVATION.—An unseasonable, 4-inch blanket of snow held no terrors for a hardy crew of tree planters supervised by the Allegany County (N. Y.) Soil Conservation District. Plantation of Scotch and Austrian pine seedlings on a farm at West Almond went ahead in spite of a late March storm. Foresters claimed the increased moisture would favor the young trees. Sticking to a well-organized schedule each spring, Allegany County has reforested 20,000 acres in the past 12 years and established national records in improved soil and water conservation, flood control, recreation, and Christmas tree production.

Windbreaks for Better Farming

By ARTHUR E. FERBER

DURING the past 20 years there has been renewed and widespread interest in tree planting, directed toward conservation of soil and water and the reforestation of lands best suited for woodland purposes. The planting of windbreaks in the Great Plains and other parts of the country has been encouraged by many State and Federal agencies and practiced by thousands of enthusiastic landowners.

Many early settlers when clearing woodlands in Illinois, Iowa, and elsewhere, left strips of native timber adjacent to farm buildings and fields for protection and shade. Others planted narrow strips of trees. During the migration to the treeless prairies of the Great Plains, many settlers planted trees for protective purposes and to alleviate the monotony of the landscape. Legislative acts were passed by the Government to encourage more tree planting, such as the Timber Claim Act and state tree bounty acts.

Many such plantings, in 10- to 20-acre block type designs, served to provide fuelwood and other products for home use, in addition to the protection afforded farmstead, livestock, and fields. Other types, such as the single row Osage-orange plantings, served as fences, and later provided fence posts.

Some of these old plantings still survive, but the vast majority died or were cut away for farming. Often the planting stock was obtained from eastern sources and the trees could not endure the rigorous Great Plains climate. Many were neglected, to fall by the wayside.

When large scale windbreak plantings in the Plains were initiated in the 1930's, there was a backlog of information available from the history of these old plantings, plus additional knowledge from state and federal experiment stations, to enable technicians and landowners to do a better job on windbreaks.

The dry thirties and the depression spurred on the great conservation movement, which included the planting of trees for erosion control and the conservation of soil and water. People were provided government-financed employment and millions of trees and shrubs were planted. The U. S. Forest Service Prairie States Forest Project, for example, supervised the establishment of approximately 220 million seedlings in Plains States, from 1936 to 1942, on 30,223 farms. These field windbreaks stretched out over 18,600 miles and covered 240,000 acres. The majority of these plantings are still in good condition and serving the intended purposes.

Prior to the soil conservation districts, the Soil Conservation Service through demonstration projects and CCC activities planted approximately 50 million seedlings in the Great Plains. These were mostly windbreaks and erosion control plantings.

At present, windbreaks in the 10-state Plains and Rocky Mountain area are planted from the eastern Dakotas westward to the Rocky Mountains and south to New Mexico and the panhandle of Texas. Approximately 580 soil conservation districts in this vast area include farmstead and field windbreaks in their local soil and water conservation work. Accomplishments in 1954 indicated the planting of approximately 21,000 acres of field and farmstead windbreaks on 9,800 farms, and include 1,100 miles of field type windbreaks. During the past 10 years, plantings have been made on some 100,000 farms and ranches. Technicians estimate an additional need for 135,000 miles of field windbreaks in this area and a combined acreage of farm and field windbreak planting of close to 1¼ million acres.

The Great Plains region is subject to a wide array of climatic and weather extremes, with periodic spells of high velocity winds. Temperature extremes range from a low of $-48°$ to a high of $115°$. During drought years precipitation may be only half of normal, or less.

Most people living here have a liking for trees, and their crops and home surroundings are usually benefited by the shelter of nearby windbreaks.

Note.—The author is woodland conservationist, Soil Conservation Service, Denver, Colo.

Young farmstead windbreak several months old. Owner is especially proud of his work, as evidenced by the fine cultivation and control of weeds. He has an older windbreak in background and has decided to enlarge his planting with the new windbreak.

Farmstead windbreaks, which protect garden, orchard, livestock, wildlife, and home itself from hot and cold winds and drifting snow, pay for their cost in a few years. The 2 or 3 acres devoted to a farmstead windbreak is one of the best possible uses to which this land can be put. Properly designed and planted, it will serve its purpose a long time. Hundreds of owners say that they would not be without one, that it adds hundreds of dollars to the value of a farm or ranch. Often a native fruit species is added to grow fruit for home use. Wildlife benefits from a windbreak. Livestock gains are greater and less feed is needed when wintered behind its shelter. House heating costs are 15 to 30 percent less. The inconvenience of snow-drifted yards can be largely eliminated with a good planting. Shade and recreational benefits constitute another advantage. A community with numerous trees adds a feeling of security and a home atmosphere which cannot be found in treeless communities.

Field windbreaks protect adjacent crops and help to reduce soil blowing. The protected area or zone of influence extends out 20 to 30 times the height of the trees to leeward and several times out to the windward side of the planting. Thus, a 30-foot windbreak effectively protects a strip approximately 700 feet wide, provided the wind is blowing at right angles. Maximum benefits can only be derived by the planting of a series of tree strips, or by enclosing 20- to 30-acre fields by windbreaks on the south, west, and north.

Innumerable landowners testify to the long-range benefits they are experiencing from field windbreaks. Many claim a decided reduction in soil blowing. Others note that sandblasting of crops is reduced, that they do not have to replant their fields. Still other farmers have observed less lodging of grain and blowdown of cotton and corn. In the north the collection of snowdrifts benefits adjacent crops due to added moisture. Field windbreaks are no cure-all for soil blowing, but when used wisely and in areas where they can be successfully grown, their use is decidedly beneficial in the long run.

Soil conservation district supervisors and cooperators receive assistance in windbreak work from various sources. Extension and research agencies contribute to educational phases and help to develop interest and provide basic facts. The Agricultural Conservation Program Service provides incentive payments. State agencies, the Forest Service, and the Soil Conservation Service provide technical assistance.

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Sample of community pattern west of Dill City, North Fork of Red River Soil Conservation District, Okla. Horseshoe-shaped and short belts on H. G. Blanton farm were designed to solve specific blowing problems and assist in special cropping plans

In the 580 soil conservation districts sponsoring windbreaks in the Great Plains, technical onsite assistance is provided by Soil Conservation Service woodland conservationists and other technicians. They are in position to assist cooperators in layout and design of windbreaks, and in their establishment and maintenance.

One of the main contributions to the windbreak work has been the districts' procurement of mechanical tree planters. There are close to 400 in use at present, and more may be purchased. Mechanical weeders or hoes are also a more recent development. Since weeds and grasses often spell failure in a windbreak planting, any contrivance or any method which will ease the job of reducing weed competition, is a decided asset.

Windbreaks for better farming is not an empty phrase—it's a reality!

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SECRETARY OF AGRICULTURE

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ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

WELLINGTON BRINK
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 29, 1954. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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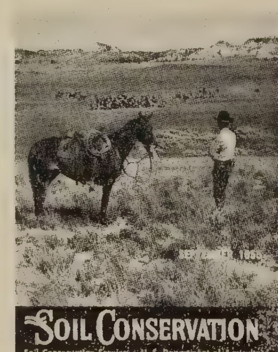
NASH WINNER.—Donald K. Wolff was among the recently announced winners of the Nash Conservation Award, professional class. The honor brought him $500 cash plus a handsome plaque. Wolff is work unit conservationist of the Soil Conservation Service at Belvidere, N. J. The award is accorded to individuals of outstanding merit in the field of conservation who have not heretofore received public recognition for their professional contributions. The recipient in this instance has made a fine record in assisting the Warren County Soil Conservation District.

The award was presented to Wolff by Ed Zern, who is national director of the awards program. State Conservationist Frank C. Edminster also was present.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Fall roundup on Quarter Circle U Ranch, Big Horn County, Mont. This is the time when conservation ranching pays off, the range still in good condition after many months of use and the cattle fat and ready for market.

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YOA Means "Young Outdoor Americans"

By WILLIAM VOIGT, JR.

THE Izaak Walton League of America has been interested in youth in resource conservation virtually since it was organized in 1922. This interest has taken many forms, including the following:

Thirty Explorers represented the Boy Scouts of America. They came from 24 States, together with FFA and 4-H delegates.

- Operating "junior" chapters, a practice discontinued some 15 years ago so as not to compete with youth groups.
- Sponsoring Boy and Girl Scout Troops.
- Aiding 4-H and other youth organizations in various ways.
- Founding the National Committee on Policies in Conservation Education, now the Conservation Education Association.
- Sponsoring summer courses and camps for teachers and others.
- Sending teachers and others to state-sponsored conservation workshops and laboratories in many states.
- Sponsoring or collaborating on essay contests on a statewide or more localized basis.

In 1953 the League national staff, in cooperation with adult leaders of the Boy Scouts of America, the 4-H Clubs national organization and the Future Farmers of America, developed a proposal for an annual conservation education conference of "Young Outdoor Americans," with a multiple purpose in mind. The League's goal is indicated in the box on this page.

Note.—The author was executive director, Izaak Walton League of America, Chicago, Ill.

Young Outdoor Americans meet annually in conference with leaders of youth organizations, technical advisers, and the Izaak Walton League of America, to discuss recource conditions, problems and needs, in an effort to discover and apply more ways by which youths and adults alike may work with greater effectiveness to help build and maintain a better, more beautiful, more bountiful Outdoor America.

YOA is:

- An annual conservation planning conference by and for young people.
- Participated in by selected representatives of youth organizations interested in natural resource conservation.
- Held in association with the League's annual convention.
- A youth conservation *program*, not a separat youth *organization*.

The League's Goal:

- To stimulate increased interest by youth in natural resource conservation.
- To spur greater attention by adults to assist youth in resource work.
- To provide a continuing mechanism for bringing together outstanding young men and women of all youth groups, to exchange ideas and bring more unity of thought and coordination to conservation activities.
- To assist YOA delegates to spread widely in their home states the worth of what they learn at the annual conferences.
- To help develop from the youth of *today*, potential—leadership in adult organizations *tomorrow*.

The proposal evolved into a program, and this has been carried out, with much success, in 1954 and 1955. As this was written last spring, the financing necessary for a well-considered 5-year program of conferences, and postconferences followup work in the states, was actively being solicited by the League.

In 1954 the YOA program brought together in Chicago, at the time of the League's annual convention, 74 young men and women. Most

were from the three youth groups named, but there was a sprinkling from other organizations. There was at least one from each of the 48 states. In 1955 there were 94 delegates, all older teen-agers, from approximately the same groups. Two states, Arizona and Delaware, sent only one youngster each. Future conferences are expected to consist of a maximum of two per state.

With these were assembled about a dozen official observers and aides from the three youth organizations; a conference manager (Dr. Harlow B. Mills of Urbana, chief of the Illinois Natural History Survey); six specialists in various resource fields enlisted as volunteers to assist Dr. Mills; and League staff members to serve in needed capacities.

In most states Governors' Committees, also volunteers, assisted with the selection of some of the delegates. In future YOA conferences it is anticipated that the Governors' Committees may serve chiefly to promote extensive follow-up work, rather than choose delegates; the latter should, it is felt, be made the responsibility of the youth organizations.

In 1954 a number of Governors' Committees, after consulting with youngsters of their states, sent in suggestions of topics the young people would like to discuss with delegates from other states. More than 70 such topics were suggested. A special committee aided the League staff in collating these. They fell easily into four general groups: cooperation, education, cultural factors, and specific resource problems. It was rather astonishing, though, to find that specific resource topics were a small minority, and that overwhelming emphasis was put by the youngsters themselves upon cooperation and conservation education as subjects they felt most needed consideration.

The following year a special committee, headed by Roland Eisenbeis, of River Grove, Ill., superintendent of conservation of the Forest Preserve District of Cook County, developed a discussion subject: Water Conditions, Problems and Needs of the United States. Background information was furnished the young delegates, as they were chosen, on the four topics, which were unclean water (pollution), too much water (flood), too little water (drought), and watersheds (water management).

A group of delegates with their State flags massed at final meeting.

The mechanics of the conference were interesting, but not necessarily of importance here except in barest outline. At Chicago, after a "kickoff" breakfast at which all received some briefing, the adults from the youth groups chose four young group discussion leaders and four "traveling recorders," and assigned the delegates from their organizations to discussion groups, in approximately equal numbers. Then the young people took over, each group devoting 2 hours to discussing, in turn, the four assigned topics. Adults were on hand only to answer questions asked of them by the delegates, not to dominate or interfere.

Instead of staying with the discussion groups, the recorders traveled from group to group with their assigned topic, thus hearing what each group had to say about it. Thereafter, at a combined meeting of YOA and League delegates, the four recorders made 10-minute reports of the discussions had in the group meetings.

The young men and women were given a farewell luncheon, a feature of which was a parade of State flags held high by the delegates as they marched the length of the banquet hall to the music of their State songs. This was followed by an inspirational talk by Dr. Preston Bradley of Chicago, pastor of the Peoples Church and a League founder.

Thereafter, they departed, to return home with their newly gained information on a vital resource subject, to spread their knowledge as far and wide as their capabilities and opportunities would allow.

It should be said that YOA began as a con-

test idea. The leaders of the youth groups made it clear that a change was desirable, and the evolution of a sound, needed, popular, accepted, and successful conservation education conference program followed quickly.

Today emphasis has been removed from the selection of delegates in contest fashion. Instead, the fullest possible weight is given to home state followup, as it is recognized that the rather costly program can be justified only by the widespread dissemination, back home, of the things the delegates learn at the annual YOA conferences. In this, the League has been assisted and encouraged by the hearty cooperation of the youth groups, by the League's local chapters and state organizations, by Governor's Committees, by offers of help from such large service clubs as Rotary, Kiwanis, and Lions International, and by various other groups of adults.

In at least two states, New Hampshire and Colorado, young delegates of 1954 have organized intergroup councils intended to stimulate more cooperative resource conservation endeavor, and a considerable variety of other post-conference activity has been stimulated elsewhere.

One youth group spokesman informed the League that YOA provided the only national occasion for interorganization consultation on natural resource conservation. The League also has been told that the opportunity given for such consultation was, in some aspects, fully as important to the youth groups as the conference itself was to the young people attending.

All things considered, the League feels it has taken the lead in a worthy youth undertaking, and looks to the future with a great deal of hope, enthusiasm, and satisfaction.

1955 delegates grouped around Izaak Walton League leaders at "parting salute" luncheon. At center is Dr. Preston Bradley, pastor of Chicago's Peoples Church and a League founder.

Tennessee Banker "Talks Up" Watershed

J. L. Crossett loses no opportunity to keep his community alerted and informed concerning the problems of the land. He carries on a continuous and effective campaign on behalf of every little tributary of Wolf River.

By BARRINGTON KING

WHEN Junius L. Crossett, president of the Moscow Savings Bank, Moscow, Tenn., decided to construct a new bank building, one of the first things he included in the plans was a community meeting room, where meetings could be held to discuss activities in the Wolf River watershed.

That gives a pretty good idea of Crossett's interest in watershed programs in general, and the Wolf River watershed in particular. The 360,000 acres in the watershed has been one of his primary concerns ever since, as a youth of sixteen, he began to notice the steady deterioration of the land in this area.

Crossett estimates that between 125,000 and 150,000 acres in the watershed is providing no return to the community which his bank serves. And from a banker's point of view something should be done about a situation of that kind. So for years now, Crossett has been carrying on a campaign for land improvement.

Visitors coming into Moscow from any direction get a preview of his promotional activities from a long way off, for the town's water tank,

Wolf River watershed's longtime goal under consideration by John Aycock, SCS area conservationist, left, and Junius Crossett, bank president.

Visitors from any direction are told by the town water tank that Moscow is the "home" of the Wolf River watershed.

towering above the surrounding landscape, proclaims in king-size letters:

MOSCOW
Home of
WOLF RIVER WATERSHED

Go into the bank and you are greeted by a map, extending across one wall in the lobby, which traces the course of the Wolf River from its origin in Tippah County, Miss., through Benton County, Miss., and Fayette and Shelby Counties, Tenn., to the point where it empties into the Mississippi River at Memphis. Pictures covering most of the wall space show conservation problems and practices.

Reach for a deposit slip, a blank check, or a pen to write with and you'll notice in gold letters on the white plastic holder: "Moscow Savings Bank, Moscow, Tenn., Sponsoring Wolf River Watershed Program."

Pick up a blotter and you'll see a small version of the map on its back, with these words printed below:

"Your Soil Conservationist Says:—

"Make Your Choice—Hillside erosion and muddy, flooding streams

"Or, Green Hills of Profit and Clear, Placid Streams."

The green pencils you also find at hand further emphasize below the name of the bank that this is the "Home of the Wolf River Watershed."

There are souvenirs for the ladies, too: Nail files in pastel yellows and blues and plastic pie knives, reminding everyone that this is the "Center of the Wolf River Watershed." There's even a plastic fly swatter that promotes the watershed idea as it urges you to "'Fly' into our bank for service."

Sit down for a serious chat with Banker Crossett, and the first thing you know he'll begin to blow up a green rubber balloon. Expanding, it proclaims in large black letters: HOME OF THE WOLF RIVER WATERSHED.

But Crossett's promotional campaign by no means ends with the seemingly unlimited supply of gadgets which he distributes far and wide. These are but the trimmings to keep the development of the watershed constantly in the public mind. The big campaign is out on the land.

It was in 1921 that the landowners of the area first began to take definite steps to solve their land problems. A group of 100 petitioners for a drainage district spent some $10,000 for a survey, only to have the project halted by injunction.

The first attempt to organize a soil conservation district also collapsed when the movement failed at the hearing stage and no election was held. But on a second try, the Fayette County Soil Conservation District was voted and was formally organized in April 1951.

A strong believer in development of the area on a watershed basis, Crossett saw in the creation of the district the first real opportunity to tackle the problems of the watershed systematically. So in June 1951 his bank sponsored a tour of the area to emphasize the watershed approach.

Included on the tour was a large group of Memphis businessmen who saw the possibili-

ties of developing the watershed, among them were representatives of the Memphis Chapter of Friends of the Land. Next came a conference of various interested groups in 1952 at which two organizations were formed to deal with separate phases of the watershed program.

Supervisors and commissioners of the local soil conservation districts in Mississippi and Tennessee formed the Wolf River Watershed Commission, to deal with practical problems on the land. Meanwhile the urban supporters formed the Wolf River Watershed Association which during its first year spent $10,000 on promotional activities.

Robert B. Snowden, of Memphis, is chairman of the association, and Crossett is vice chairman and also chairman of the commission.

With activities organized in these two groups, things began to happen. Residents of small subwatersheds began to organize to tackle their problems as groups. One of the first of these was the Green Acres watershed, which includes land along three small creeks, where a $6,000 community house was built with their own labor and without outside assistance.

The Hays Crossing subwatershed, also involving three small creeks, held a ministers' conference in their community house for consideration of conservation problems. Ministers were asked to deliver at least one sermon a year on conservation and its advantages.

A cooperative forest fire control program was begun in 1953.

The same year residents along several miles of the Wolf River organized a channel clearing project in which trees, snags, and drifts were removed in a community undertaking.

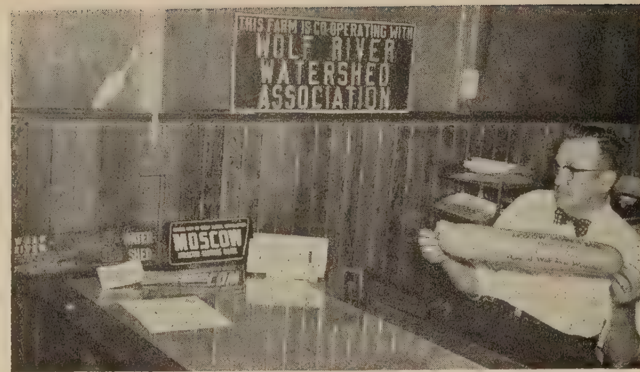
The Wolf River Sportsman's Club was formed at Moscow with divisions of boating, hunting, fishing, and soil conservation.

Civic clubs in towns along the river endorsed the watershed-development idea.

By 1954, 10 subwatersheds had been organized and were participating in the soil conservation program.

The Wolf River Watershed Association provided metal signs showing cooperation in the watershed program for farmers who established three or more practices recommended by local soil conservation districts.

With such sustained interest on the part of local people, it was not surprising that when



Numerous souvenirs help spread the story of the watershed.

the pilot plant watershed program came along, two of the original pilot plant projects were located on subwatersheds of the Wolf River. These are the Mary's Creek watershed in Shelby County, Tenn., and the Sand Creek, in Fayette County, Tenn., where programs are actively underway with technical assistance of the Soil Conservation Service.

The Wolf River watershed, with its 360,000 acres, was too big for a program under either the pilot plant or watershed protection and flood prevention program. But this doesn't deter Junius Crossett in his longtime dream for the watershed's development.

Every big watershed is made up of a lot of little watersheds, he points out. If they can just get enough subwatersheds organized along Wolf River, the big problem will take care of itself. Meanwhile, he's going to continue to plug for the final objective with everything from nail files and fly swatters to water tanks.

POSTER CONTEST.—The Lee (S. C.) Soil Conservation District recently sponsored a poster contest in the graded schools of the district during Soil Conservation District Week. A total of 125 posters were prepared by fifth, sixth, and seventh graders and 26 prizes were distributed. The winning poster was displayed in a show window for 10 days.

LIKES COASTAL BERMUDA.—W. M. Terry, cooperator of Allendale (S. C.) District says: "If it hadn't been for my 50 acres of Coastal Bermuda, I don't know what I would have done this year. I've had 100 cows on it since early spring and it has held up very well under drought conditions. I now have 150 acres of this grass and expect to plant some more next year."

New Ideas Out of Engineering Studies

By EUGENE G. McKIBBEN

WITHIN this last year the agricultural engineering research branch at three locations has initiated work which will be of specific interest to soil conservation workers. This work is in cooperation with the soil and water conservation research branch.

At the Tillage Machinery Research Laboratory at Auburn, Ala., basic studies are under way on the relationships between types of tillage, transport and traction equipment and the methods of their use, and the effects on the soil's physical characteristics. Here also more directly applied investigations are underway on the effects of variations in disk blade design on performance, and on the effects of various combinations of tractor tire width and height on performance under varying operating conditions. The latter is at the request of, and in cooperation with, the tractor tire subcommittee of the Society of Automotive Engineers.

At Iowa State College cooperative research is being done toward devising new and improved equipment and methods for conservation farming in the humid Corn Belt areas. Of current promise is a "ridge farming" plan for corn.

At Pendleton, Oreg., cooperative research has been started on the development of special equipment for conservation farming practices in the dryland wheat and pea-producing area.

Note.—The author is chief, agricultural engineering research branch, Agricultural Research Service, Beltsvile, Md.

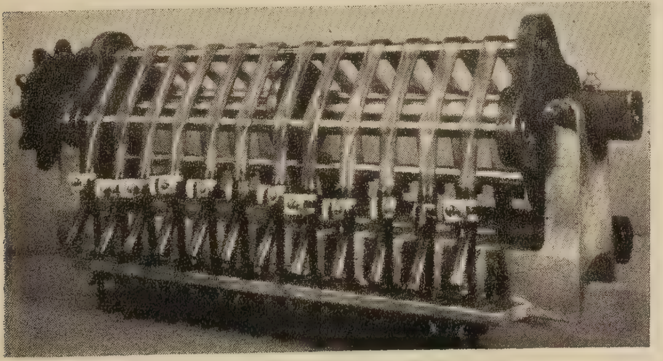


Figure 1.—Modified Tennessee hose pump.

No. 6

This is the sixth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

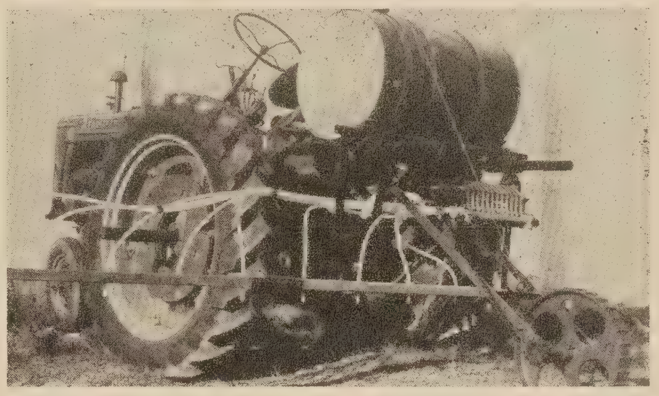


Figure 2.—Commercially built hose pump with mounting brackets and independent ground drive to give application of fertilizer solution proportional to distance traveled.

Progress findings will be made available. In the meantime, we will welcome suggestions from any soil conservationists who may have an opportunity to visit these projects.

In addition to projects directed specifically toward soil and water conservation problems, there are many other projects which lead to findings of significance to conservation.

As an example is the modified Tennessee hose pump shown in figure 1. This pump is being used as a metering unit for the application of liquid fertilizer. Important features are a discharge rate proportional to speed over the usual operating range, and a provision for multiple-discharge connections at relatively low cost. The parts in contact with the fertilizer solution are corrosion-resistant stainless steel and plastic. No moving metal parts are in actual contact with the solution being pumped.

Figure 3.—Use of portable posts for electric fence to control rotation grazing.

Tests in North Carolina last season gave very good results and the pump is commercially available this season. Figure 2 shows a unit mounted on a farm tractor with independent ground drive.

Preliminary tests in the laboratory indicate that it may operate satisfactorily against low pressures, perhaps up to 20 p.s.i. Additional research in laboratory and field is needed to establish the pump's possibilities and limitations.

This pump was invented and patented by H. A. Arnold of the University of Tennessee and the first model was built in 1944. During the years immediately following it had but limited use, partly because of its relatively short

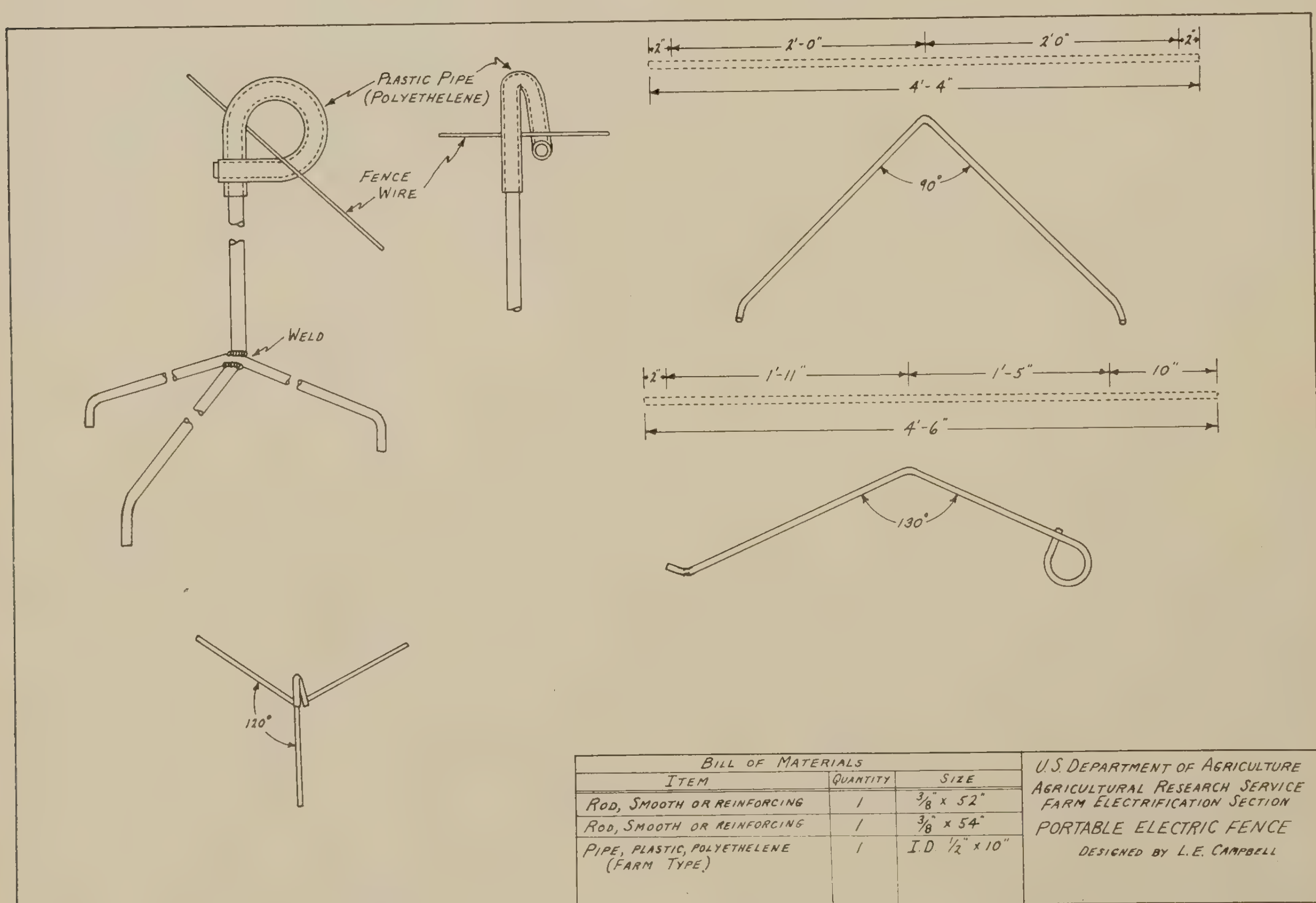


Figure 4.—Details for construction of portable post for electric fences.

Figure 5.—Bunker silos at Agricultural Research Center, Beltsville, for studying feeding and engineering problems of this type of storage, and particularly for the determination of the amounts and causes of losses and the development of means of reducing such losses.

life and the erratic, unsatisfactory performance of the material then available as hose.

When a project was initiated in 1953 in cooperation with the North Carolina Agricultural Experiment Station for research on the development and improvement of equipment for metering corrosive solutions through a number of discharge hoses and directly proportional to the distance traveled, the Tennessee hose pump was one of the devices studied. Modifications were developed and laboratory and field tests made at Beltsville and in North Carolina by Charles W. Gantt, Jr. and Walter C. Hulburt, of the Agricultural Research Service, and Henry D. Bowen, of the North Carolina Agricultural Experiment Station.

Modifications which improved the performance of the pump were the use of a plastic (vinyl chloride acetate) for the pump hose, individual adjustments for hose tension, and the addition of a center wheel to support and give continuous rotation to the reel rollers mounted in sealed ball bearings. Laboratory tests indicate that the operating life of the plastic hose sections should be between 300 and 400 hours. At present prices, the replacement of hose sections for a 12-outlet pump can be obtained for less than 5 dollars.

The recommended speed range is 50 to 400 r.p.m. Within this range and with correct hose tension, the discharge per outlet is 0.04 gallon per revolution. A USDA leaflet on this pump is being prepared and should be available soon.

Still another product of our research is the portable post shown in figures 3 and 4. This ingenious post offers the possibility of readily changing electric fence locations for rotation grazing or other pasture management practices. It is made of a 3/8-inch steel rod, either smooth or reinforcing type. It uses 1/2-inch plastic (polyethelene) pipe as an insulator with a design that allows the post to be readily installed at any point along a tightly stretched fence wire without disturbing the wire or adjacent posts.

This plastic, which is commonly used for cold water lines and thus is readily available, is an excellent insulator, particularly during foggy or rainy weather. It is essentially nonwetting. Other types of tubing should not be substituted without first determining their insulating qualities.

This portable post was designed by Lowell Campbell of the farm electrification section of ARS. It can be made readily by local welding shops or even by many farm shops. While this design has worked quite satisfactorily in field tests, it should not necessarily be considered as the final form. It is expected that shops and farmers will make such changes as they believe will result in a more effective post for their local situations. It is hoped that as the possibilities of portable electric fences for grassland management become more widely known and

(Continued on page 40)

New Land For New People

By NEIL MICHAELSON and GEORGE A. WOODRUFF

DURING the summer of 1953, the Soil Conservation Service, at the request of the Board of the Alasaka Soil Conservation District, made a survey of the agricultural potentials of land in the Susitna Flats area across Knik Arm from Anchorage. At that time, very little information was available on the agricultural value of this area which was being used as an antiaircraft gunnery range.

Climatic conditions must necessarily be favorable for agricultural operations. Here in the Susitna Flats the climate can be considered similar to that of Anchorage. The average annual precipitation is 14.55 inches, with 11 percent of this falling as rain during April, May, and June, increasing to 47 percent of the total precipitation from July through September. Lack of moisture during the early summer season does not cause crop failures. However, yields may be adversely affected during some of the drier years. The average growing season extends over a 115-day period.

The Susitna Flats are composed primarily of level to rolling uplands adjoining tidal flats along the north shore of Cook Inlet and the eastern edge of the lower Susitna Valley. This area extends northward and eastward for a distance of approximately 10 miles to a belt of steep hills and ridges that lie between the Big Lake area and the Inlet shores near Anchorage.

A survey party of four men was organized at the Palmer headquarters of the Soil Conservation Service for the job of mapping the soils of this area. Transportation was the main obstacle to be overcome in mapping this inaccessible region. There were no roads or trails for moving men and supplies into the region. Consequently, the general plan of attack included trail-building for overland travel, boat trips, and trips by float plane to numerous lakes which dotted the area.

Note.—The authors are soil scientists with Agricultural Experiment Station and Soil Conservation Service, respectively, Palmer, Alaska.

A small bulldozer was used to build a truck trail for jeeps from the road's end at Big Lake across the Susitna Flats to Horsehose Lake at the southern extremity of uplands. The "dozer" operator worked his way behind a blazed trail through the hills and down across the flats, establishing base camps along the way. Black bear were attracted by his food supply and cooking efforts. In one night's foray, Bruin stuck his head in through the tent flaps as a matter of introduction.

The survey crew departed on a boat trip down the Little Susitna River to the Inlet to map isolated uplands along its banks. An obliging Alaska Railroad section crew loaded the boat, supplies, and men onto a speeder at Pittman and wished them a good trip as they helped slide the boat into the river at the Houston bridge. This crew mapped a large area of virgin country and had many experiences in swift, shallow water with hidden rocks, large log jams, and "sweepers." One of the illustrations with

Survey crew lunching on g

this article shows the crew pausing for lunch on a gravel bar. Escapades with bear and moose, as well as evenings of good fishing, added to the enjoyment of the trip. The bore of an incoming tide and rough waters of the Inlet provided excitement for the crossing from the river's mouth to the Anchorage shores, where a rough, dirty, and weary crew climbed out on the dock.

The final land capability maps are made from aerial photographs, and are used for guiding settlement in the area and as a basis for later work in planning the farm enterprise for maximum conservation of the soil and its fertility.

Survey of the main body of land in the Susitna Flats area followed the river trip. The rough "dozer" trail was about all that man and the jeep pickup could take. The trail led over steep hills, along ridge tops and across the flats. After a few days of rain, the slick trail over these hills presented a real challenge to stamina. Les Green, Palmer bush pilot, flew the surveyors from lake to lake during the course of the survey. The men took many trips on foot to other sections of the flats.

Soils in the Susitna Flats which have agricultural value are the well-drained mineral soils occupying level to rolling uplands. The forest cover is mixed spruce and birch that in the Horsehoe Lake area shifts to a dense birch stand of marketable size. These soils have developed in a deposit of medium-textured, silty material laid down by wind and water over the gravel plains of the Horsehoe Lake area and the sandy terraces along the Little Susitna River to a depth of from 10 to 20 inches.

Oat field with snow covered mountains in background, half a mile east of Palmer.

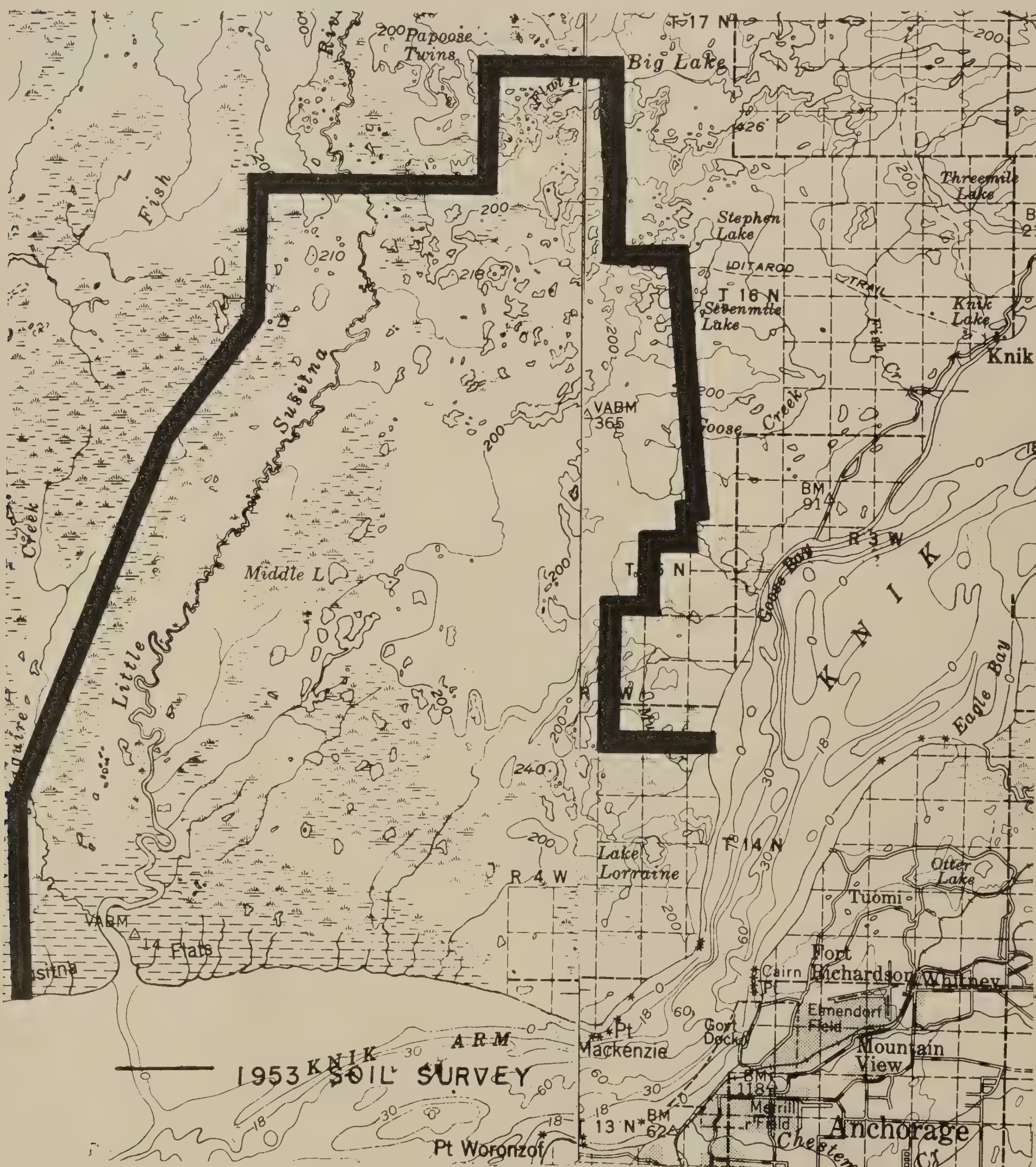
ar, Little Susitna River.

What soil will the homesteader find in this virgin area? This question can best be answered by the following brief generalized description of a soil profile from the Horsehoe Lake area:

Depth in inches below surface of mineral soil.	Physicial characteristics.
Overlying organic mat	Dusky red accumulation of leaves, stems, and roots in upper section; sometimes underlain by a partially-decomposed layer of this material.
0–1	Ashy gray layer of mineral soil having a loose, silty texture, and granular appearance; contains a large amount of plant roots.
1–3	Dark reddish-brown layer of soil having a silty texture, granular appearance, and containing a large number of plant roots.
3–17	Dark yellowish-brown layer, loamy textured, composed of a dense body of fine-grained soil particles. Root penetration terminates in this layer. Color is graduational from darker overlying layer to lighter material below.
17–25	Olive brown layer having a dense-bodied appearance, uniformly sandy-loam in texture, representing the original mineral material of the deposit from which the soil developed.
25 plus	Gravels, sands, and cobbles.

The upland soils are low in fertility and require heavy applications of nitrogen, phosphorous, and potash for satisfactory crop produc-

tion. These relatively shallow soils are very permeable to downward water movement and are considered droughty during the period of low rainfall in early summer. Irrigation may be needed for top yields of field and garden crops. The area contains numerous lakes which could provide a source of water for irrigation purposes. When the land is cleared and farmed, sound conservation practices must be followed to retain the soil and maintain a favorable level



This is the Susitna Flats region.

The famous Matanuska Valley, with Knik Glacier in background.

of production.

The non-agricultural soils found in the flats are peats, mucks, and tidal silt deposits. Peat and muck soils occupy a large part of the land between Horseshoe Lake and the Little Susitna and also show up as small scattered bodies along the riverbed. The tidal silts occupy a large acreage adjacent to the Inlet and upstream along the river to the point of high tide. Peat and muck soils have little agricultural value. Peat is composed of raw plant remains and is cold and wet. Fertility is low and would remain the same after drainage. Muck is a wet mixture of decomposing plant remains and mineral soil. Some of these mucks, depending upon location, could be drained. The tidal silt deposits can produce moderate amounts of forage for livestock.

Forty-nine percent of the 124,870 acres surveyed in the Susitna Flats has soil suitable for agriculture, a large part of which is in a block of land north and east of Horseshoe Lake. The

Cabbage on Max Sherrod farm. A newly planted windbreak is at the left; strip of grain planted for wind protection at right.

birch stands of this area have economic value as flooring, interior finish, wall and furniture veneer, and handles for tools.

From a consideration of the soil and climate of the region, there is no apparent reason why crops would not grow as well as in the Anchorage area nearby, where livestock, grain, and truck crops are raised.

Here is land for young men and women who are interested in carving a farm out of the wilderness. There exists an opportunity for the development of agricultural and forest resources in this corner of Alaska.

Here is, indeed, an abundance of new land for new people. Alaska will be hearing more about the Susitna Flats and its potentialities in the near future.

An evening's catch from the river.

ENGINEERING STUDIES

(Continued from page 35)

used that effective commercially made portable posts for electric fences will become available.

Research is also being done on silos. In spite of its advantages as a feed, the use of silage has increased slowly. The 8 million tons of grass silage used in 1951 represented only 3 percent of the total forage crop harvested. This relatively small use is thought to be due to cost of structures and equipment for completely mechanizing the harvest, storage, and handling of silage in good vertical silos; and uncertainty as to the extent of losses in amount and feed value when stored in the less expensive and sometimes more convenient horizontal silos.

Horizontal silos are cheaper to construct than upright silos. They do not require elevating equipment for filling, and they are easily adapted to self-feeding of livestock. On the other hand, losses in trench, horizontal above ground, and stack silos as generally handled usually appear to be excessive. The wide variation in losses reported indicates that farmers do not estimate such losses accurately. Changes in the weight and volume of decayed silage, and the hidden losses from fermentation and seepage, make an accurate estimate of losses by the farm user difficult if not impossible.

The bunker silos shown in figure 5 were constructed at the dairy farm on the Agricultural Research Center at Beltsville, Md., for cooperative research on the making and storage of silage by the agricutural engineering research branch and the dairy husbandry research branch. The picture shows one silo being filled with long grass, the other with chopped grass from the same fields. The engineering phases of this work are concerned with minimizing the losses from the field to the feed bunk. Factors influencing these losses include methods and equipment used to harvest, store, and feed the material; the structure in which it is stored; the way in which it is packed in the silo; and the effectiveness of material used to seal the surface of the silage. The study includes measurement of the loads on bunker silo walls.

Dairy husbandmen are interested in the losses in feed value as affected by storage conditions, fermentation, leaching, and seepage. Feed ing trials are used to determine the feed value and palatability of the silage.

Financing Conservation Farming

By BUIS T. INMAN

IMPORTANT to the farmer in deciding on the soil, water, and plant conservation plan he will adopt is how best to finance the changeover. Conservation farming often means forgoing immediate income in order to increase future income. Such deferment of income can involve a critical decision, particularly for farmers whose resources are depleted or whose farms are small. It may limit the amount of current income that can be used in other places in the farm business; or it may limit the use of income for family living.

Answers to some of the questions regarding investment requirements, costs, added returns, and timing of costs and returns from soil and water conservation practices are being found through research of the production economics research branch, Agricultural Research Service, in cooperation with a number of state agricultural experiment stations in the Midwest.

On the rolling lands of central Indiana the alternative conservation cropping systems for 160-acre farms are limited. There, the most profitable cropping system, and one that provides adequate conservation measures, requires that half of the rolling land and a fourth of the level land be in forage crops.[1] When less than half of the rolling land is in roughage crops, crop yields are reduced severely even though contour farming and grass waterways are used. Feeder cattle and hogs, or dairy cattle and hogs, are the most profitable livestock system. The livestock and cropping system recommended would increase the net income from a farm by more than $2,500 over that realized from a farm under the existing system. The farmer would need from $13,000 to $17,000 additional capital to make the changeover, depending on whether feeder cattle or dairy cattle were kept. This capital would be needed for repair and alteration of fences and buildings, purchase of machinery, line and fertilizer, and increases in livestock, feed, and supplies.

> **No. 7**
>
> **August's special issue on farm woodlands interrupted the research series. We are catching up this month by offering two articles on investigations which are being conducted by the Department of Agriculture on problems of soil and water conservation. This is No. 7.**

Rather than provide for the additional investment from current income, ordinarily the farmer would be better off financially to borrow money, make the changeover to a soil-conserving system of farming in a few years, and then repay the loan from his increased earnings. By borrowing, the final plan would be achieved more quickly and the debt paid off rapidly. The plan requires 11 years for all major farm investments. Cash farm income will be higher during this period except for 1 or 2 years in which purchases of fertilizer will be large.

Farmers on small farms and with relatively low incomes often experience difficulty in adopting a conservation system of farming. Frequently, by clearing a few acres of land or draining wet areas, they can overcome much of this difficulty. By improving more productive areas they can seed down erosive areas to pasture or have a smaller acreage of grain in the rotation. Unpublished data for the Saginaw-Thumb area of Michigan indicated that only 62 percent of the cropland was well drained. About 16 percent needed a complete tile job and 22 percent needed tile between present lines. Investments in tile of $100 per acre paid for themselves in 5 or 6 years through increased farm returns. Drainage increased per acre yields 60 percent

Note.—The author is assistant head, northern field research section, production economics research branch, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.

[1] Janssen, M. R., and Robertson, L. S., "Economic Effects of Applying Conservation Measures on a Rolling Central Indiana Farm." In press.

and also permitted the growing of higher-return crops. Cash-crop farmers were a long way from achieving the 20-percent minimum of full-season sod crops currently recommended for the area by the local soil conservation districts.

A small dairy farmer in north-central Wisconsin on a 160-acre farm of gravelly and sandy loam also established a conservation system of farming by clearing land. His plan provided for clearing 18 acres in 3 years and converting 10 acres of steeply sloping cropland to pasture.[2] In changing to a conservation plan the farmer reduced his annual acreage of grain by 3 acres but he maintained his production of grain through better land treatment. By enlarging his dairy herd to utilize the additional forage produced, his labor income was increased by more than $700. The cost of land clearing, including bulldozing, farm machinery, and family labor, was $48 per acre.

St. Clair and Madison County, Ill., farmers near East St. Louis, who practiced a high degree of conservation farming during a 10-year period averaged $6.98 per acre more than those with comparable soil resources but a low degree of conservation farming.[3] Similarly, in McLean County, in central Illinois, conservation farming showed an advantage of $4.77 per acre, while on more rolling farms in northwestern Illinois the advantage was $6.41. Wise land use was an important part of the conservation system of farming. The high-conservation farms had a higher proportion of their tillable land in hay and pasture. These included deep-rooted plants, particularly alfalfa and sweetclover. Greater use of stripcropping, contouring, terraces, grass waterways, and buffer strips also permitted a larger acreage of cultivated crops without serious soil erosion. Both crops, and livestock to utilize the crops, contributed, along with good management, to the higher incomes of the high-conservation farms.

On the slowly permeable soils of northeastern Illinois, high-conservation farms earned in 1954 approximately $5 per acre more than low-conservation farms with comparable soil resources. There, a suitable cropping system for many farms requires that 40 percent or more of the cropland be in forage crops. These farms must also have a sufficient number of well-managed livestock to utilize the forage.

In an attempt to answer the question of costs and returns of individual conservation practices, data are being collected for a number of areas. In Illinois studies, terracing cost $3 to $5 per 100 lineal feet. In Northeastern Illinois, grass waterways averaging 40 feet wide, required an outlay of about 10 to 21 cents per linear foot. A 4-year study on 270 farms in Illinois showed that man-labor and power and machinery costs were $24.50 per crop acre when farm operations were conducted on the contour and $26.08 when not on the contour. On the returns side, a 7-year record of the effect on yields of crops grown on the contour in contour strips or on terraced fields was compared with the yields of customary up-and-down-hill cultivation. The results were as follows:

Crop	Yield increase from contouring		
	Percent	Bushels per acre	Value
Corn	12	6.9	$7.38
Soybeans	13	2.7	5.64
Oats	16	6.9	4.69
Wheat	17	3.4	5.37

In summary, conservation systems of farming in the central Midwestern States generally require an increased proportion of cropland in forage crops and a well-managed livestock program to utilize the additional forage efficiently. This kind of program means a considerable increase in farm capital, and 3 or 4 years of the initial installation period before conservation farming increases net farm income. Crop yields, however, increase in the first year.

Several alternatives are open to farmers for providing the additional capital required in developing a conservation plan. Farmers may be able to provide the capital from savings or from current income by reducing farm and family expenditures. Livestock enterprises may be expanded by saving breeding stock from farm herds. When it is profitable to proceed more rapidly, borrowing may be necessary. Some commercial credit agencies are well informed as to the costs of and the returns from conser-

(Continued on page 45)

[2] McNall, P. E., and Anderson, H. O., Economics of Land Improvement as Applied to Two Farms in Lincoln County, Wisconsin. Dept. Agr. Econ., Univ. Wis. August 1954.

[3] Sauer, E. L., and Case, H. C. M., "Soil Conservation Pays Off." Ill. Agr. Expt. Sta. Bul. 575. April 1954.

Forty Years as a Tree Farmer

By C. T. PROUT, Jr.

ANYONE who owns or operates land suited to growing commercially valuable forest trees can practice tree farming. H. H. Gaston of Spring Hill, Ala., is a good example.

It was early morning when we drove through the front gate and stopped in the side yard. By the time we could get out of the car, Gaston was there to greet us. We were foresters—he a tree farmer. And he was interested in showing us his tree farm. Maybe we could tell him a better or cheaper way to do things, or perhaps we could give him a practical suggestion for increasing production.

The first thing we did was to see his tree farming tools. They were few and simple—axes, hoes, rakes, flap (belting a foot square with a 5-foot handle attached), pruning saw, tree planting tool, and a back-pack fire pump, all loaded on a four-wheel drive Army surplus jeep. We were not given much time to handle them—we had to "go-to-the-woods."

During our jeep ride over his tree farm, Gaston told me his story. His early life was spent as an itinerant laborer in sawmills, on section gangs, and as general roustabout throughout the Southern States. During his travels he kept looking about to see where he might settle down eventually.

Growing trees had always fascinated him. He was conscious of trees wherever he went. "It looked to me like the trees in this area were healthier and growing faster than anywhere else I had been," he told me. So, he, like Brigham Young on looking at the valley of the Great Salt Lake said: "This is the place."

Gaston settled in Spring Hill 40 years ago. He first bought and operated a small farm. As he could, he bought more land—timberland. Here he raised his two children. Fourteen years ago he started planting trees on the land that did not have pine on it already. He told me: "I had learned by then that pine trees were my best crop."

Note.—The author is woodland conservationist, Soil Conservation Service, Mobile, Ala.

Pruning improves quality of pine saw logs and is a routine practice on the Gaston farm.

He bought land with trees already growing on it, and land without trees. From that with trees he cut a few from each acre "selectively" —those that could be harvested and still leave plenty for later years. On that without trees he planted young pines—500,000 of them—350,000 by hand until last year. Then he borrowed one of those tree planters—"But I don't

let anybody else run it. I want to know my trees are planted right."

Not only must his trees be planted right, but all his trees—both "natural planted" and hand planted—must be helped to grow bigger faster. Fire lanes—clean plowed strips, 6 feet wide between the rows of planted pines and wider around the edges of fields, were in evidence. He cut out the "no good" trees, those of poor form or diseased, and sold them when they were ready for market, "To give my good trees more room to grow." He pruned his best trees and cut off the lower limbs to make higher quality lumber because he thus gets more money for the trees. He said, "I used to keep an axe on my plow so when my mule got tired I could go out in the woods and work while he rested."

"How long can a man work like you are working?" I asked, thinking maybe his 68 years was about the limit. "This isn't hard work, it's the easiest thing I ever did in my life. Besides, if I didn't have my woods to walk through, why I'd die in no time. I'll live to be a hundred years old, if I just stick to my woods. If I let a week go by without going in my woods, I just don't feel good."

I said, "I guess you are not thinking of selling your 2,700-acre tree farm?" "Nope, not much anyway. Last week there was a man here from one of the paper companies wanting to buy it—said he'd give $150,000. I told him it was worth more than $200,000. How did I figure it? Very simple. I have 800,000 trees and on the average they are worth 25 cents apiece—that's $200,000. Why I'd be foolish to do that—I figure that each day each acre is worth 10 cents more than it was the day before."

Gaston knows he has a good investment. His health is good, financially, physically, and mentally. And he is living in the presence of the trees he loves.

The Soil and Human Health

IT is always an inspiring experience to meet with Friends of the Land. They are a diverse group representing many businesses and many professions but sharing a common interest in our natural resources. They are bankers and housewives, industrial tycoons and physicians, garden clubbers and civic leaders. What makes them special is that they give of their time and mental reserves to wrestling with the problems of health—soil and human.

For the fourteenth consecutive year Friends of the Land conducted in June an institute dealing with soil, food, and health relationships. Again, the place was Chicago; and again, the Illinois State Medical Society and the Illinois Academy of General Practice were partners and consultants. Together, the sponsors presented a program which brought to Chicago speakers from colleges, research centers, and laboratories from as far distant as New York and Washington and as near as the great Medical Center in the Windy City itself.

"We cannot separate soil, water, and man," said Ollie Fink, program director of Friends of the Land, in sounding the keynote. "No one resource is an independent or self-sufficient unit. They are all bound together. We begin with the headwaters, each little stream, and many times we thus largely solve the problems downstream. The initiative must come from the people, for we all live on a watershed."

Friends of the Land has helped us move up in our thinking, has helped to create a favorable climate for the conservation job. And the 1955 nutrition conference exemplified how Friends of the Land itself has advanced; in the words of its president, Dr. Jonathan Forman, "This is not a meeting where the glories of rural living are extolled but where we cope with the sweat and tears of soil losses and nutritional deficiences." Another speaker, John J. Miller, director of biological research for the J. B. Roerig Company, mentioned the close identification of the institute with the medical profession, where "broad issues of conservation are related to what goes on in a doctor's office."

Dr. Robert S. Kesel, of the College of Dentistry, University of Illinois, expressed some

alarm at the rise in tooth decay, citing a 15 percent increase between 1929 and 1949 among entering students at the University of Minnesota. He discussed the attacking forces and the conditioning factors that may be involved. Among the latter, he listed climate, water supplies, emotional tieups, endocrines, individual health, the physical character of food, the effect of mineral elements, vitamins, and proteins in the diet. He warned that teeth are decaying 4 to 5 times the ability of dental manpower to repair the damage.

Dr. Firman Bear, soil scientist working on an emeritus basis with Rutgers University, entered on two notable discussions of the soil's contribution to life. Pointing out that a family's meals once were the product of one soil, he noted that today a breakfast may include butter and milk from Wisconsin, bananas from Yucatan, coffee from Brazil, salt from Michigan, sugar from the Philippines. "Soil puts its mark on mankind," he summarized. "But *what* soil?"

Mankind, he conceded, benefits from food produced on soil that contains a variety of organic matter, rich in all nutrient elements.

"I am convinced," said Dr. Bear, "that man is an inorganic entity as well as an organic entity. Yet most of our studies deal with the organic aspects. Any study of an individual element by itself is relatively worthless. The spectograph has an interesting ability to show you all the content at one time. I'm interested not in potassium, or calcium, or magnesium, or sodium by itself. To me, they are significant in terms of their combining weights. Any consideration of them in terms of percentages can be utterly misleading. It is the mass-action effects that are important. A New Jersey potato farmer noticed an extensive magnesium deficiency and applied potassium fertilizer—then he was in real trouble, for he threw his field out of balance still further."

Dr. Bear expressed concern over mounting world population, that of the United States in particular. Here, he said, our numbers are increasing 1.7 percent a year, faster than the average for the rest of the globe. Our country is not all in a humid climate; there is much that classifies as desert or semi-desert. It will take 50 million tons more food to satisfy our needs by 1975. And yet, there is a hopeful note.

Dr. Bear expects science to supply the answer to our food problems, just as it has supplied the answer in the past. He pointed to the accomplishments of mechanization, synthetic fibers, the use by crops of nitrogen taken from the air, the advances in insect and weed control, the progress in irrigation in both dry and wet areas, our knowledge of how to limit dust storms. He expects our farmers to increase production to meet major needs by vertical expansion rather than horizontal expansion. He expects "bumper" crops to be the rule rather than the exception. He pointed to the disadvantage of feeding hogs corn and then eating the hogs. He spoke of the forests tremendous reserves of food. "I think the time will come," said he, "when we shall know the secret of the chlorophyl molecule—and if we ever get that under control we can feed any number of people." Feeding the future's larger populations, he held, is "largely a matter of energy. Have we enough? We are not using today the energy of the sun, waves and tides, the atom—but I think we will."

The theme of this year's institute was well put by the speaker who declared: "Conservation of natural resources starts with you. Take care of your own appearance, get rid of trash, dress up your yard. Then get out beyond your own person and look the country over. If you see any river running red, any gullies, do something about it. Make your country beautiful! In the words of David Starr Jordan, we must "stir up a lot of absurd enthusiasms."

—Wellington Brink

FINANCING CONSERVATION

(Continued from page 42)

vation farming and are ready to make the necessary loans. Farmers who cannot obtain suitable credit for soil and water conservation on reasonable terms from commercial or other sources may obtain the necessary credit through a new governmental program administered by the Farmers Home Administration. It makes loans available for soil and water conservation for use by farmers or groups of farmers to pay cash costs of materials, equipment, and services for such land-improvement measures as construction and repair of terraces, establishment and improvement of permanent pastures, fencing, drainage, and ditching.

Educating Farmers in Farm Woodlands

By A. M. SOWDER

WHEN we see a farmer who is successful with his trees, we are prone to wonder just what aroused his initial interest. Skill in woodland improvement or tree planting is a result of some form of the educational process.

What was the incentive? Was it love of trees, the prospect of added income, the influence of an agricultural program, attendance at a meeting or demonstration, the reading of a newspaper or magazine, or the suggestion of a neighbor?

I posed this question last summer to the owner of probably the most publicized improved farm woods in America—O. K. Smith, of Kootenai County, Idaho, who since 1935 has had 70 acres of white pine trees under intensive management. Here are the answers: Smith loves trees. Properly managed, they bring him increased income. They improve the looks of his farm and, pruned, they help reduce the fire hazard. On the main route to and from town he passed by a demonstration woodland improvement project which was established about 1930 under the direction of the county agent and marked by a large 3 by 5 foot sign. Thus, he had a variety of reasons to engage in farm forestry.

Smith does his own timber harvesting, markets the products to effect close utilization, carries on a fence post treatment project, and plants trees when necessary. He allows no fires, permits hunting upon request, and at four score years of age is looking forward to continued wood crops from his farm woodlands.

O. K. Smith has been a model of cooperation with public and private agencies—the Soil Conservation Service, the Forest Service, the Extension Service, the University of Idaho, the State Forester, and the American Forest Products Industry. Local Soil Conservation Service foresters found Smith's woods a show me place, and when the AFPI Tree Farm program was launched O. K. was one of the first to join.

There is a vast amount of educational work yet to be done among farmers to put their farm woodlands in shape, to say nothing of the tree planting job, wood preservation, and other projects which come under a farm forestry program. In general, farm forestry is the most neglected of all farm enterprises. Yet it could be one of the most profitable.

According to most recent estimates, only 15 to 20 percent of the woodland area owned by farmers is under good forest cutting practices. The remainder is classified as being fair to "poor and destructive." Of the 139 million acres of commercial farm woods, over 100 million acres fall under the fair to poor category. Not more than a fifth of the farms needing windbreak protection have an adequate tree barrier for farmstead and field.

Are farm woods worth worrying about? Definitely, yes! They constitute 40 percent of our private commercial forest and produce one-fourth of the saw log requirements of the nation, about one-third of the pulpwood, and the bulk of fuelwood, fence posts, maple syrup, and similar products used on the farm and for sale. In value, wood ranks tenth among all farm crops, bringing in about 700 million dollars a year to farmers. The farm woodlands of America are valued at 2 billion dollars, estimated at 1946 selling prices. The trees on this tremendous capital value in land through annual growth can bear interest returns from 5 percent to 15 percent a year.

A well managed farm woodland, on good forest soil, adequately stocked with desirable trees, can easily produce several times as much as the untended woods which are usually heavily cutover. Thus, with the advantage of being

Note.—The author is extension forester, U. S. Department of Agriculture, Washington, D. C.

Sawyer County, Wis., 4-H boys and girls meet with S. J. Uhrenholdt in his farm woods near Hayward. Uhrenholdt was 81 years old when this picture was taken. This woods is now designated State-owned timber harvest forest.

close to markets and generally on better forest soils than the mountain forests, American farmers have a potential but yet unclaimed annual revenue of several times the estimated 700 million dollar revenue now obtained. A fly in the ointment is the fact that some 3¼ million individual farmers own these farm woods, which average only 42 acres in size. How are we going to reach them?

The question could be asked, "What does the planting of trees add to the value of the farm?" Records show that a good windbreak or shelterbelt adds from $500 to $1,500 to such value. This figure is concurred in by farm real estate appraisers. Such plantings provide some forest products, conserve moisture, reduce home heating and livestock feeding costs, furnish food and cover for wildlife, and supply protection to the soils and crops.

Granting the need for more attention to the two major farm forestry activities—woodland management and tree planting, how are we going to get the job done? For one thing, we need to channel more such information to farm papers. The basis for our articles could be bulletins, research notes, progress reports, and the like. One of the best means extension has for reaching farm people is through demonstrations, meetings, tours, and the like.

Seaman A. Knapp made this statement: "What a man hears, he may doubt; what he sees, he may also doubt; but what he does, he cannot doubt." Our first job is to arouse a farmer's interest to attend meetings or demonstrations. Once there, he sees for himself but still may doubt what can be accomplished on his own farm. However, if we can get the farmer to initiate farm forestry practices on his own farm, he is well paid for his efforts and he no longer can doubt.

In some instances it is possible to give extension help to individual farmers but more people can be reached through group meetings and demonstrations. This enables us to ac-

complish much more in our efforts to help farmers help themselves—a fundamental philosophy of the extension program.

One of our best sources for getting a farm woodland job done is through the rural youth, especially through the 4-H, Vocational Agriculture, and FFA, together with the Boy and Girl Scouts conservation programs. In 1953 some 35,000 boys and girls completed 4-H forestry projects and another 200,000 4-H Club Members received definite training in forestry. Under the 1954 National Conservation Good Turn Program, Boy Scout headquarters reported 38,125 projects in forestry. Not infrequently, through our work with their youngsters, parents have been induced to lend a hand in adult programs. One of the most effective activities for reaching teen-age youngsters is the school forest program where the students actually help with planting, improvement, and harvesting. These youngsters are the future custodians of our forest resources and eventually will manage our farm woodlands for continuous production.

Farm forestry extension work among farm people is carried on through county agents. That's at the tree roots. Records show that in 1953, 1.2 percent of their time was devoted to forestry. However, some forestry would have necessarily been involved in allied lines of work such as wildlife, soil and water conservation, forest fire prevention, and program planning. Extension training schools and workshops to include farm forestry are often made available to extension agents where more technical training has not been possible. This extension work is headed by state extension foresters employed by the land-grant colleges and there are 75 to 80 of them at the moment. All but three states carry the extension forestry project. Some states have up to four extension foresters.

Extension forestry goes hand in hand with the technical service program. Besides the helping hand of the United States Department of Agriculture, there are many other agencies engaged in these two categories of farm forestry. These may be mentioned—with apologies to those which space forbids listing: American Forestry Association; American Forest Products Industries; American Pulpwood Association; American Tree Association; Forest Farmers Association; Forest Industries Council; Izaak Walton League; Southern Pulpwood Conservation Association; Tenessee Valley Authority; Trees for Tomorrow; many railroads and banking institutions; and last but by no means least—women's groups.

Wood using industries feel the responsibility of furnishing markets for the small farm woodlands. One company in an effort to put across the effects of forestry among small woodland owners developed a cooperative forest management program. As a trial balloon these first included doctors, lawyers, newspaper men, and farm leaders, and later included dirt farmers, with splendid success.

There is a great deal of work yet to be done in educating the millions of farm woodland owners as to the management of their woods and utilization of forest products, and in encouraging every windswept farm owner to establish a protective tree planting. But with everyone doing his part the job is not impossible.

ONE WAY TO INCREASE YIELDS.—Dave Cameron, of the Catawba (S. C.) Soil Conservation District, likes grass-based rotations. He has found that he can double his yields of corn, cotton, or tomatoes by planting such crops after several years of fescue and ladino clover.

SOIL CONSERVATION

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SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

WELLINGTON BRINK
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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CONSERVATION BOOKLET.—The Soil Conservation Society of America has published a unique new publication in the form of a well-written, well-drawn, authoritative book: "The Story of Land—Its Uses and Misuse." It is well adapted to use in schools and for distribution to the general public. Within its 16 colorfully illustrated pages are condensed the major facts appropriate to its title. There is much historical material which leads naturally to a discussion of practices in modern soil and water conservation. The booklet is equally suitable for urban and rural readers. Grownups as well as children find it pleasant and exciting reading. The Society reports that the demand for its latest product is very impressive.

—WELLINGTON BRINK

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—This is the Helen King farm in Lehigh County, Pa. The pond is a tenth of an acre in area and seven feet deep. It is spring fed and a fine asset not only for recreation but also for fire protection.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Grass Carpets Way to New Wealth

Five hundred farmers and ranchers use their district to install a land program that is bringing increased prosperity to an Idaho County. Everyone benefits, town and country alike.

Governing body of farmers' district: standing—Joseph Heinrich and Donald Beigh; seated—Delbert Williams, Chairman Duane Brent, and James Cahill, Jr.

By HUGH F. EAMES

ABOUT 500 ranchers and farmers in Idaho's Weiser River Soil Conservation District are racking up one and a third million dollars' income each year in new or "extra" income.

A revolutionary shift from dryland grain to grass and livestock production accounts for much of this new income. Intermediate wheatgrass and livestock production are important factors. Drainage, land leveling, and irrigation are big helps also.

What's going on in this district is having its influence on adjacent Payette County, Idaho, and across the Snake River in Malheur County, Oreg. Here there are no districts yet, but farmers and ranchers are independently following the Weiser lead. Some of the 175 farmers in Washington County who have not yet become district cooperators likewise are benefiting from what their neighbors are doing. These extra profits from outside the district itself make Weiser's accomplishments still more impressive.

Gains have come largely through (1) seeding and management of irrigated pastures, (2) seeding of legumes and grasses in dry land (including range), (3) improvement of irrigation methods and practices, and (4) drainage and reclamation of water-logged acreages. In these four categories, the achievements of the Weiser River farmers have meant an increased income of more than $1,360,000 annually:

2,500 acres of improved pastures that have added $275,000 annually to values of beef and milk production;

17,358 acres of dryland pasture and range seeding that have brought increased production of beef valued at $384,000 on 93 farms and ranches;

Carl Bumgarner typifies the Washington County farmer who clicks as a Weiser River Soil Conservation District cooperator. He stands in 6-ton-per-acre corn.

7,000 acres of land leveling, 3,500 acres put under sprinkler irrigation, and 13,000 acres of improved water application, all of which have added $516,000 annual income at 338 farms, and

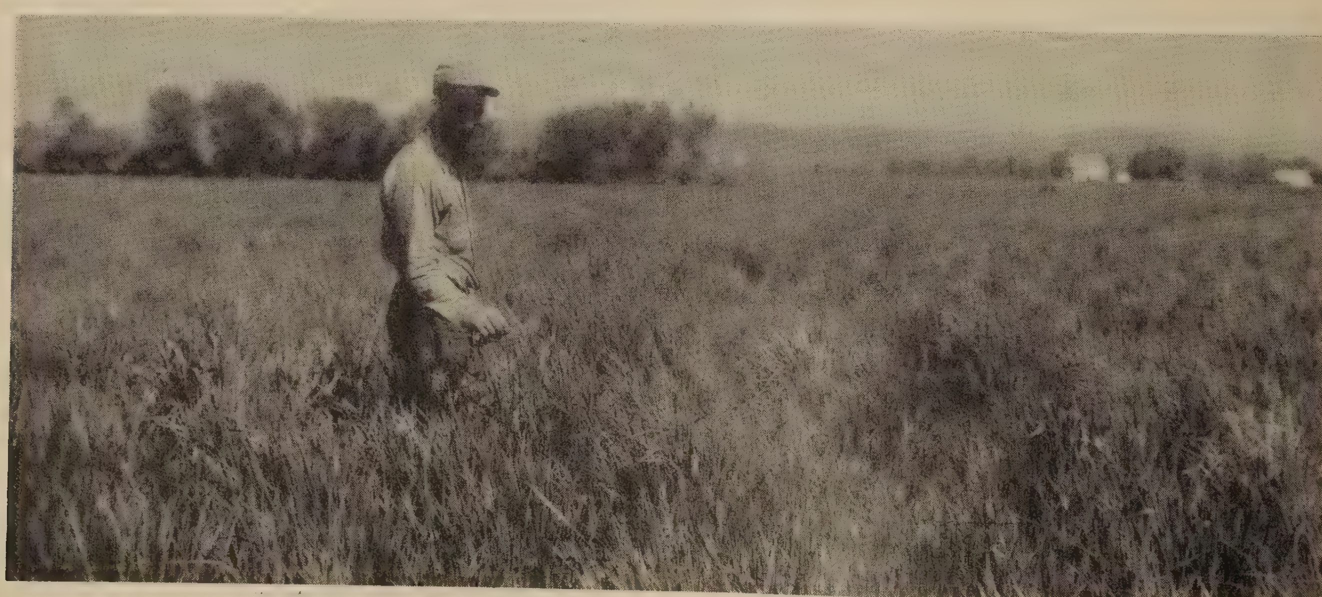
7,500 acres of drainage at 205 farms, where annual income has been increased $187,000.

At least 35,000, and perhaps 50,000, acres of Washington County's dry grainland and unproductive range have been shifted to grass. Population of beef cattle has been boosted at least 10 percent and the number of farms and the productive cropland acreage have been increased. Production of more and better forage and hay, and establishment of adequate stock water facilities in pastures and ranges, have brought spectacular gains in the poundage of meat marketed and in dollar returns. Part of these gains have come from building better quality into the herds.

These improvements and many more under the soil conservation district program, including erosion control and rebuilding of the soil's fertility and water holding capacity, tell why the U. S. Department of Agriculture has recognized the record of the local Soil Conservation Service staff with a hard-to-get Superior Service citation. It lends emphasis to the statement of the district supervisors in an annual report: "High quality technical service of Soil Conservation Service is the backbone of our district program."

Duane Brent, who runs 1,000 head of cattle on a 12,000-acre ranch, has been chairman of the district since 1945. He is the only board member who has served continuously since the district was organized in 1942. He accredits "educational activities" as being the key to district progress, The continuous drive since 1942, he points out, has meant a long, hard pull from which results did not always seem to come as quickly as desired. But every year, he says, there were as many as half a dozen grass, livestock, irrigation, and general farm tours, events arranged for as few as 6 or as many as 100 farmers, to show how improvement could be wrought if land were handled in a different way. Now, he observes, results are piling up rapidly on dry and irrigated acreages.

Also important in paving the way for the current quickening of results, he notes, is Weiser's annual midwinter farm institute and soil conservation day now coming into its ninth year under district and Chamber of Commerce auspices. At the start it drew about 100 people. Each year interest has swelled, and more than 500 people attended this year. The district has made effective use of demonstrations on farms and ranches. Its work has been helped by spreading the services of technicians through opening of a Service field office at Cambridge, by rotation of monthly district board meetings among six communities, by work done in schools and with other groups, by PTA essay and poster contests.



Donald Beigh stands in one of his fields of intermediate wheatgrass.

Frank G. William's beef cattle graze on irrigated pasture. There's a lot of it in the Weiser River Soil Conservation district

"All of this basic activity," Brent says, "stems from teamwork on the part of many people. It also reflects the support received from the SCS plant nursery at Aberdeen, and from the wholehearted cooperation of the county agent, the Agricultural Conservation Program Service and various other local, county, State and Federal agencies."

Washington County has found that, as Brent says: "What is good for agriculture is good for all of us. Everyone benefits when a farmer harvests 3 or sometimes 4 tons of high quality grass from each of many acres that previously didn't produce anything marketable. We all gain when improved pastures and range yield beef and better beef at higher prices. Everybody benefits when annual new incomes like these replace the dwindling dollars that came from producing only 4 to 10 bushels of grain per acre each year or perhaps only every other year."

So it is that when you ask almost any Washington County operator just what good he has gotten out of the district program, he'll stop working even during a rush season and smilingly talk about his experiences. Typical is Archie Wiggins, telling about accomplishments on his 85-acre farm. He got his first help in a group drainage job that benefited 5 farms; later he had assistance in land leveling, drainage, irrigation, and comparable jobs. He continues to be surprised by the results of improvements made in a 10-acre field that "was good only for running a span of old horses." The very first year after improvements in his irrigation system he harvested 50 bushels of wheat per acre. It has been doing equally well ever since.

"We small farmers in this area would hate to be without our district," says Wiggins. "It would be a blow to our community because most of us down here have been helped a lot. Technicians do not try to crowd work on us before, or faster, than we can handle it."

W. Clay Sutton, Midvale farmer, as a boy came out of Missouri with his homesteading parents and in 1919 made a start with 280 acres of brush. Today he and two sons, Buhl and Wayne, own and operate about 3,900 acres, of which 1,200 are cropland. He got his conservation start with the old CCC, and by being helped by SCS technicians who taught him that grasses and legumes are better crops than grain on dry land. Clay's program put him in the grassland and livestock business and took him out of enterprises in which he had been so unsuccessful that he lost both land and cattle. He recovered most of the land, which became the nucleus around which to build his 3,900-acre enterprise.

Carl Bumgarner, of Cambridge, is widely known as a producer of purebred Suffolk sheep. He has benefited through land leveling that lets him take lush production from irrigated pastures, hay, and other cropland. In 1953 he leveled 35 acres at a cost of $1,900, thus increasing his alfalfa yield 2 tons per acre. At $22.50 per ton this meant $1,575 added income. Next year he finished paying for the job and started pocketing the profit. Leveling a 28-acre field that contained swales and gullies required moving

of 12,000 cubic yards of earth at a cost of $1,109. Sweetcorn, the first crop following this work, yielded 6 tons per acre. With corn selling at $25 per ton and ensilage at $5 per ton, the net income amounted to $140 per acre. Grass and hay production in that field has been increased by one-third.

Bumgarner says that saving water is the most important gain from land leveling and the reorganization of his irrigation system. Under the new setup, he irrigates alfalfa once instead of three times. He uses 75 percent less water than previously and saves much time. "Benefits reach far beyond my boundary lines," he avers. "My neighbors are helped through improvements in the water table." Two hundred of his 300 acres are irrigated, 35 being in pasture.

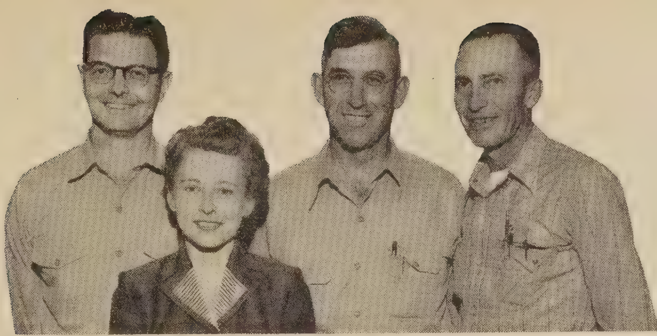
Dewey Alexander is a Midvale area dryland rancher who was encouraged to adopt grass when he got down to a production of but 5 to 9 bushels of wheat per acre where he should have been getting 20 to 25 bushels. "There was no use grinding machinery away for nothing," he comments. "Therefore, I followed the districts's lead and established grain and grass in rotations—a year or two of grain followed by 8 to 10 years of grass. My wheat yields are up to an average of 25 bushels per acre." He keeps about 150 acres of wheat and barley in rotation with grass.

Don Beigh raises beef and hogs at Cambridge. He is a young farmer who began with 20 acres, now has 400. He runs 75 head of cattle, and a bunch of hogs that turn out surprising profits. In 1944 he didn't have an acre in grass. Now there are 350 such acres.

Ray Roberts, a young farmer at Sunnyside, is just getting started in a land leveling and irrigation program that is unique because there is no outlet for waste water. He has to use all of it, down to the last drop. Some folks say a piece of land can't be irrigated if there isn't an outlet for waste water. What's happening here is an exception to the rule. This last spring, when Roberts had to rush the job so as to get seed into the soil, he put $100,000 worth of contractor equipment to work and got a $3,000 job done in a hurry at no extra cost. About 17,000 cubic yards of earth were moved in reversing flow of water. Sweet corn, his 1955 crop, will be followed by sugar beets. He did the improvenment work because he was getting only 19 tons per acre of sugar beets instead of 25 tons or more.

Myrl Preston, a part-time farmer has 45 acres at Midvale. He owns a 16-head dairy herd and works 5 days a week in a sawmill. He's been on this two-way job for 10 years. Almost all of his acres now are leveled for irrigation. In leveling a gullied 36-acre piece where 6-foot fills were required, he did the work over 3 or 4 years by using a riding fresno pulled by 4 horses. He dug ditches with a small tractor pulling a farm-made tool. A competent judge

Don Siften specializes in grass and legume seed production. Here he is in a field of crested wheatgrass planted as a row crop.



Staff working with district, winners of Superior Service Award: Forrest Closner, in charge; Lael L. Dorman, Joseph T. Harrer, and Clare L. Gentry.

last spring said: "I have seen no better grass in Washington County." Preston harvests 50 bushels of wheat per acre as against only 20 bushels previously. He gets other top yields where formerly was bare ground. Myrl occasionally takes a ribbing from his wife, who reminds him that he once said: "I don't believe the district can or will help me." Finally he asked the district's help. And now he declares: "The district and its facilities made our place."

At Sunnyside, Luther Roberts is in the middle of a 4-year leveling job on 150 acres, laid out in 20-acre irrigation units. In the old system in effect when he bought the place water was running in five different direction in fields full of short rows. He is establishing irrigation to fit the need of each individual field, with no common pattern except 640-foot rows. Under the old system, he says: "We were worked to death handling water. Under the new setup, with the help of two small sons, I can change and set siphon tubes in any field in half an hour." His flat ditch system works like a reservoir and is easier to keep clean than the conventional ditch.

Roberts' benefits from his improvements are indicated by what has happened in one of the fields. He planted corn which was disked as green manure after the ears were sent to a cannery. It produced 28 tons per acre of sugar beets the next year. At a total cost of $130 per acre, he took off a $200 per acre crop. He remarks: "There was more work watering 10 acres the old way than there is watering 40 acres now."

It was, naturally, a Weiser River Soil Conservation District cooperator who won the 1954 county, State and Northwest award for being Grassland Farmer of the year. The man who won was Milton W. Branch, who recently became chairman of Idaho's soil conservation commission. He has been a director of the National Association of Soil Conservation Districts, president of Idaho State Association of Soil Conservation Districts, and a member of the Weiser River Soil Conservation District board.

In 1929 Branch started operating a 320-acre ranch in Crane Creek area. He now handles nearly 10,000 acres, including 200 under irrigation. He has 1,000 acres in alfalfa and an equal expanse in crested and intermediate wheatgrass and other good grasses. He put up 27,000 bales of hay last year, expects to make 50,000 this year. He grows about 200 acres of grain for livestock, annually feeds out 100 head of beef, and runs 500 to 600 head on 3,600 acres of range where he has a strong reseeding program. He annually knocks out about 100 acres of sagebrush for seeding at a total cost of $5 per acre. Branch credits intermediate wheatgrass as being the most important factor in his success.

This rancher built nearly a dozen reservoirs for stock water, and now finds that they are no longer filling from runoff. Erosion has ceased and stream beds are becoming well grassed. About the same amount of rain is falling, but well grassed slopes are soaking it up and holding it for use in dry weather. Milt Branch estimates that as many as 50,000 acres of grass have been developed in the district through conversion from wheat, the reseeding of wornout ranges, and other improvements.

Frank Heckler, county agent since 1946, has teamed well with the district. He says it's program "is getting pretty well over the hump and that from now on it will largely be a matter of mopping up." Frank estimates that 30,000 or more acres have "gone to grass" since he came to the county, and that about half of this acreage once was poorly producing dry land. "The district has given the county's economy a big lift," Frank says.

Douglas McGinnis, agricultural sparkplug at Weiser's Idaho First National Bank, says "The Weiser River Soil Conservation District is immensely important in getting Washington County's agricultural industry reestablished on a sound basis." The bank urges farmers and ranchers to become district cooperators and to take marginal land out of grain and put it into grass and livestock operations.

Elton Tarter's first crop of alfalfa: 6,400 bales from 56 acres, an average of 3.7 tons per acre for the whole field. From 22 acres of 2-year-old grass he harvested 2,700 bales, approximately 4 tons per acre.

One of the most faithful and effective supporters of the soil conservation district is Harry Nelson, editor and publisher of *Weiser American* and *Weiser Signal,* weekly newspapers. He has been backing up the district program ever since it started.

The Weiser River district was the tenth among 42 now organized under Idaho State law. It was organized to take over when the CCC was demobilized, after farmers had learned that they could produce more profitable crops than wheat on their dry land. One SCS technician remained to work with CCC cooperators until the district was ready to function in 1943. During the following years many problems were created by shortages of labor and equipment, and the district's complete lack of funds. Through careful management a small fleet of machines and a small operating fund were built up, but it was not until 1947 that the district finally obtained heavy equipment. That came about when it paid a $1,500 freight bill for moving a $20,000 cat with angle dozer and 8-foot carryall from Mexico, where the United States had sent it for foot and mouth eradication work.

These two accomplishments by district supervisors set the stage. The bulk of conservation progress in this 700,000-acre area has been made during the last 5 or 6 years.

Weiser's board of supervisors in addition to Chairman Brent are Joseph Heinrich and Delbert Williams of Midvale, James Cahill, Sr., of Weiser, and Donald Beigh of Cambridge. Mrs. Hazel Closner, Weiser, is secretary-treasurer

(Continued on page 59)

Many of the county's farmers, in groups like this, were converted to conservation farming when they learned they could grow good grass where wheat was uncertain.

DISTRICT PROFILE

TED HEGSETH of MINNESOTA

TED HEGSETH of Minnesota mixes soil conservation with just about everything he does. And his activities are many. They include a farm credit business, a grain elevator, a county fair, a soil conservation district, his church, and of course his own 579-acre farm.

County fair exhibit in which Hegseth took a hand.

Ted Hegseth has been chairman of the West Otter Tail Soil Conservation District since 1944. He is immediate past president and area director of the Minnesota Association of Soil Conservation Districts. The effects of his generalship in helping to develop a strong leadership in local districts as well as at state level will be felt for years to come. When he stepped out of his presidency recently, there was an informed and able group of directors who selected a successor from their own number and proceeded immediately to get on with the business of the Association with continuity and dispatch.

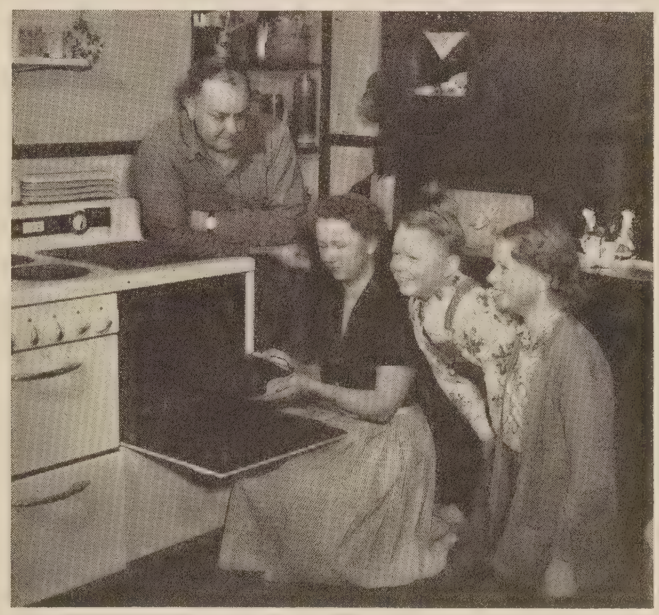
Ted for 13 years has been president of the Fergus Falls Production Credit Association. The Association insists that a farm, in order to insure repayment of a loan, have in effect a complete soil and water conservation program.

As president of the Carlisle and Oscar Farmers' Elevator Company, Ted pushes continually for soil and water conservation farming so that better quality of grain, as well as quantity, will be grown by the patrons.

He never misses a chance to show movies on soil and water conservation, particularly to the people in his church. He has developed a small film library of his own on soil and water conservation with his 16mm movie camera.

An excellent soil and water conservation exhibit appears at the local County Fair each year, no doubt partly because Ted is a director on the Fair Board. Responsible for the booth of course, is the West Otter Tail Soil Conservation District.

Three years ago the district set up a soil conservation air tour which attracted 248 persons. For possibly the first time in Minnesota a "live" demonstration of soil erosion in the process of taking place was shown. It was Ted's idea, built by himself. As the picture with this article shows, there were 5 boxes 3 x 4 feet each, set on legs so that there was an 8 percent slope at the surface of a 6-inch layer of soil. A pipe with small holes was attached to the high ends of the boxes. This pipe was connected up with a water pressure system, and a turnoff valve enabled the man in charge to control the flow of water. One box held virgin topsoil, the second hard-farmed topsoil, the third severely eroded soil, the fourth from a field rotated to crops with a high percent of alfalfa brome in the rotation, and the fifth was a stripcropped field on a miniature basis. Applying water to each of these boxes easily demonstrates the difference in infiltration and erodibility under different soil conditions and practices.



Ted Hegseth and family.

Ted and his son, Ted, Jr., are seen in the picture operating the demonstration. Since first shown at the air tour in July of 1952, this demonstration has appeared at the county fairs in the area, has been copied and shown in southern Minnesota, and was used at the 1954 Minnesota State Soil Conservation Field Day and Plow Matches.

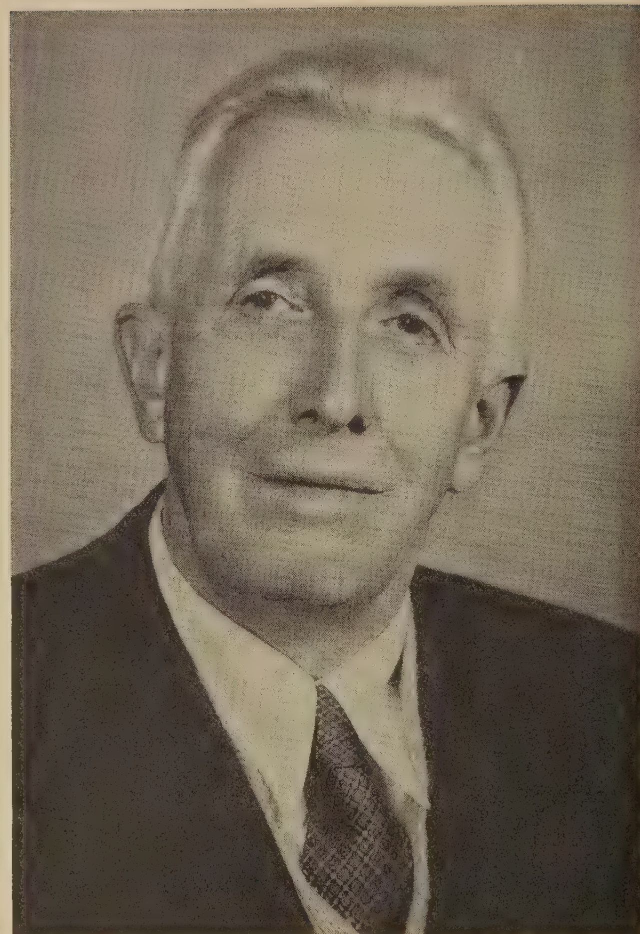
Ted is an enthusiastic flier and chooses that mode of transportation whenever practicable. He usually flies to the National Association of Soil Conservation Districts' Convention and various other meetings in and out of Minnesota.

Ted has many community interests. He is a member of the local school board, the sportsmen's club, the Selective Service Board, the University of Minnesota Institute of Agriculture Advisory Committee. He is a master seed grower and member of the Minnesota Crop Improvement Association.

As this is written, he is very busy serving as Chairman of the 1955 Minnesota State Soil Conservation Field Day and Plow Matches, which will be held on the Trosvik Brothers' farm 5 miles north of Rothsay, Minn.

DISTRICT PROFILE

RAY THURSTON of MAINE



Ray Thurston.

BACK in 1947, the farmers of Knox and Lincoln Counties in Maine became interested in the establishment of a soil conservation district. Present at one of the meetings held to discuss such an organization was Ray Thurston, of Union. He believed that a soil conservation district would be helpful in promoting farm woodland management and better land use, both of which he felt important to his locality.

When the district was established, Ray became a supervisor. Having already demonstrated his ability in public office during 4 years as Town Selectman, 2 years as a member of the Governor's Council, and in several other local offices, his selection as chairman of the Board of Supervisors was to be expected. Ray is still a supervisor, and still chairman.

Ray Thurston has been farming for almost half a century. He planted his first orchard in 1910, and orchards have continued to be his major enterprise. For a few years he raised canning crops, and the first contour farming and stripcropping in the district were established on his farm. In addition to his orchard, he is presently growing 35 acres of blueberries and doing an excellent job of managing his 50-acre woodland. After 20 years of "farming his woods," Ray is convinced that handling his woodland in the right way is just as important as using modern management for orchards or blueberries.

Ray is a firm believer in cooperation. He finds time to take an active part in the Extension Association and other farmer activities.

He has been active in the affairs of the Maine Soil Conservation District Supervisors' Association ever since it was organized, serving as its president in 1952.

Interest in the state supervisors' association led to interest in the National Association of Soil Conservation Districts. He has attended

five national conventions, sometimes as a delegate and sometimes on his own.

Ray's leadership and his enthusiastic support of the National Association were recognized at the 1955 meeting when he was selected Northeastern Area Vice President. He looks at this new responsibility as one of the most important he's ever had, and he is already planning a program which he believes will stimulate further the district program interest in the Northeast.

—RUSSELL ALBRIGHT

Tomatoes on Contour

DAVE CAMERON grows tomatoes in a grass-based rotation on his farm near York, S. C., in the Catawba Soil Conservation District.

When asked what he thought of grass-based rotations, he said, "It's the only sensible thing. I can double my yields of corn, cotton, or tomatoes by planting these crops after several years of fescue and ladino clover.

He has 20 acres of tomatoes now following fescue and clover. He left contour strips of

Sarah Ashe and top quality tomatoes grown in grass-based rotation.

Contour strips of grass were left as access avenues when harvesting tomatoes or laying irrigation pipe.

grass as access avenue to use when moving irrigation equipment or when gathering tomatoes. These grass strips are on the contour and so are the rows.

Working with irrigation equipment on grass access strip between tomatoes.

This system of farming helps to conserve soil and water. In addition to getting maximum benefit from natural rainfall by conservation farming. Cameron is irrigating his tomatoes from one of the 11 ponds on his farm.

Technicians of the Soil Conservation Service helped him with his conservation program.

—J. B. Earle

GRASS CARPET WAY

(Continued from page 56)

and Lee Williams is equipment manager. In past years, W. H. Linder, W. Clay Sutton, Dewey Alexander and Travis Tongue of Midvale, Milton Branch of Crane Creek, James L. Warren, Carl Bumgarner and August Jeagers of Cambridge, and James McCrea of Weiser, have served on the board. Linder was the first chairman.

Among the SCS technical staff members who have worked with district cooperators for as many as 13 years are Forrest Closner, who heads the unit; Joseph T. Harrer, engineer, and Clare L. Gentry, conservationist.

He Rebuilt Circle G Ranch

Most Circle G land looked like this when Germany bought it.

By J. H. CHEEK

E. B. GERMANY changed an unsightly, non-productive landscape of hills and hollows covered with tickle grass, poorjo, and scrub oaks into a productive, picturesque panorama of soil building grasses and legumes.

Germany is president of the Lone Star Steel Company and a well known rancher of Van Zandt County, Tex. He accomplished his feat in the last 8 years on his 325-acre Circle G Ranch 3 miles south of Grand Saline.

In 1946 when Germany acquired the ranch it was carrying 15 head of scrubby livestock that looked to be as underfed as the land was overgrazed. Today 110 head of sleek Angus and Brangus cattle graze 300 acres of crimson and hop clovers, vetch, sericea lespedeza, dallis and bermudagrass. Some 60 tons of hay are cut and put in the barns each spring.

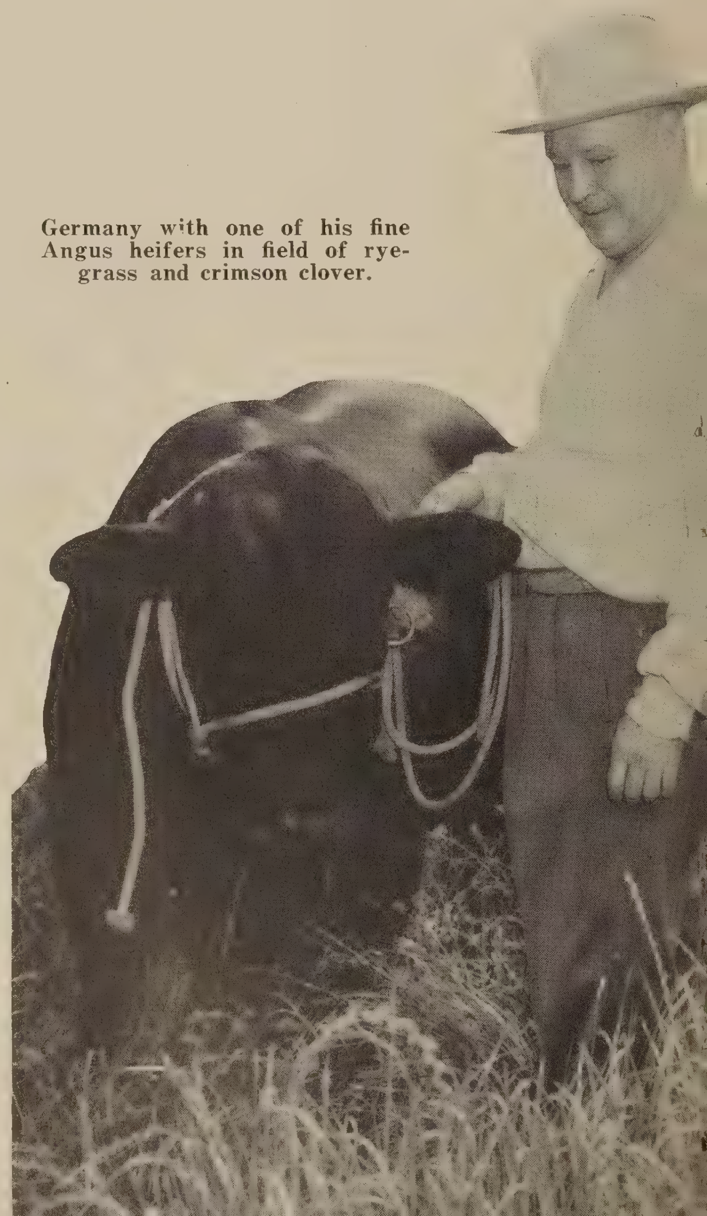
Today Circle G livestock are in such fine condition they look like show animals. Some of them are. R. A. Davis, manager of the ranch, has won several blue ribbons at stock shows in the Southwest lately with cattle from this spread.

Note.—The author is work unit conservationist, Soil Conservation Service, Mineola, Tex.

When Germany purchased his place the neighbors thought it was the poorest piece in Van Zandt. But Germany explained: "I did not buy this ranch to build a display of fine houses, barns, and fences, but to rebuild its wornout soils. I believe I can do that in a reasonable length of time and make a fair return on my money while doing it."

At once he became a cooperator with the Neches-Sabine Soil Conservation District and through it, sought the assistance of the Soil Conservation Service in soil, water, and plant conservation.

The technicians first made a soil survey of the entire ranch. The information thus obtained was the basis for the recommendations put into



Germany with one of his fine Angus heifers in field of rye-grass and crimson clover.

the ranch plan. Davis, the manager, translated the plan into a living, growing thing. He said: "I like it because it is all written down on the aerial photograph, field by field. It is workable, concise, and easily understood."

The plan that Davis liked so well called for clearing 200 acres of timber and seeding it and another 100 acres to adapted grasses and legumes. The other 25 acres were reserved for farmstead, lakes, and spots of woodland for livestock and wildlife shelter. Cross fences were recommended for controlled grazing. Ponds were located at vantage points for stock water. Recommendations were made for stocking the ponds with fish and planting shrubs for quail food and cover. The original plan was

Ranch Manager R. A. Davis, Conservationist J. H. Cheek, Circle G owner measure vetch and hop clover in a 60-acre f

Angus cows and Brangus bull on crimson clover at Circle G Ranch.

revised to include an irrigation system as insurance against droughts, and to provide for hives of bees to be placed in the fields of vetch and clover for pollination and to furnish honey for the table. Manager Davis has followed these recommendations meticulously.

Among the unique things that attract your attention at Circle G is a fence grown from thorny multiflora rose that defies passage of everything but rabbits and they have to be awfully careful to get through!

Then there are several coops of quail—51 pairs in all—that raise about 600 birds each year. Some are turned loose to feed and hide in the multiflora rose and other wildlife habitats. The rest are not so lucky—they go to the deep freeze!

Under normal conditions a 10-acre lake that lies adjacent to the farmstead furnishes enough fish for the Germany's table—even to the third generation.

Commercial Fertilizers for Conservation Farming

By J. RICHARD ADAMS

MANY conservation practices depend to a great extent on the use of fertilizers. Application of the primary plant nutrients, nitrogen (N), phosphoric oxide (P_2O_5), and potash (K_2O) is often necessary to establish and carry the luxuriant cover crops needed to conserve the soil. Liming materials and some form of sulfur are frequently used to supplement the secondary elements calcium, magnesium, and sulfur supplied by the primary nutrient materials. Trace elements must be added in certain localities to overcome deficiencies, particularly in boron.

With one exception, consumption of each of the three primary nutrients in agriculture has increased annually since the fiscal year ending June 30, 1943. The phosphoric oxide used in 1953–54 was about 1.3 percent less than in 1952–53. The mounting consumption of plant nutrients has been met by increasing the production and the nutrient content of established fertilizer materials and mixtures, and by using materials new to the industry. At the same time the physical properties and methods for the application of fertilizers have been improved. These developments have aided in simplifying fertilizer application problems and have helped to hold fertilizer prices at a low level relative to the other commodities the farmer has to buy.

Consumption of all fertilizers increased 104 percent from 1942–43 to 1952–53 and then droped 2.7 percent the next year. The primary plant nutrient content increased from 2,345,000 tons in 1942–43 to 5,896,000 tons in 1953–54, an increase of 151 percent, and the concentration increased from 20.5 to 25.9 percent. The higher concentration in 1953–54 offset the drop in fertilizer consumption below 1952–53 to such an extent that the tonnage of plant nutrients consumed in 1953–54 was greater than in the previous year.

Much of the increase in concentration has been brought about by the greater use of the higher analysis nitrogen materials:—ammonium nitrate (32.5–33.5% N), ammoniating solutions (37–49% N), and anhydrous ammonia (82% N). Domestic use of fertilizer-grade ammonium nitrate was first reported in 1943. Subsequently the consumption of this material has shown a marked increase. Thus 846,252 tons were applied directly to the soil in 1952–53 and about 500,000 tons were used in the producing plant, primarily in the manufacture of the aqueous solutions of ammonium nitrate and ammonia (ammoniating solutions) used in the production of mixed fertilizers.

Anhydrous ammonia, as such, was first applied to the soil as a fertilizer in irrigation water in the early 1930's. Its use for direct injection into the soil did not come into prominence until after World War II. It is estimated that 22,397 tons were used for direct application in 1946–47. The quantity so used in 1953–54 amounted to 350,474 tons.

Originally, ammoniating solutions and aqua ammonia were used only in the manufacture of mixed fertilizers. Their use enabled the manufacturer not only to formulate mixtures to contain 3 to 4 percent of nitrogen from relatively less expensive and more concentrated materials than had been used previously but also to improve materially the physical condition of the finished product. Recent advances in ammoniation and granulation techniques now make it possible for the manufacturer to produce mixtures containing 8 to 9 percent of nitrogen from

Note.—The author is in the fertilizer and agricultural lime section, soil and water conservation research branch, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Md.

ammoniating solutions. The farmer may now apply ammoniating solutions directly to the soil with equipment similar to that developed for the injection of anhydrous ammonia. Other aqueous nitrogen products, containing 21 to 32 percent nitrogen and consisting of solutions of ammonium nitrate alone or with either sodium nitrate or urea, are also on the market. They are used for direct application and since they contain no volatile ammonia they may be sprayed on the surface of the soil with no significant loss of nitrogen. These modern developments have increased the use of solutions, including aqua ammonia, for direct application from 21,911 tons in 1949–50 to 191,592 tons in 1953–54. This is in addition to the increased quantities of ammoniating solutions used in the manufacture of mixed fertilizers.

No. 8

This is the eighth of a series of articles to appear from time to time in explanation of the vairious phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

Urea is used in the form of ammoniating solutions and as a solid. Urea ammoniating solutions were first produced domestically in 1932 and solid urea fertilizer (42–45% N) in 1935. This use has been restricted by limited production facilities. Three new plants are now in production and a fourth is under construction with a total rated capacity estimated to be more than 600 tons of urea a day.

Among the newer materials that may find an important place in the fertilizer industry are urea-formaldehyde products (urea-form), diammonium phosphate and calcium metaphosphate. Urea-form is a new, low-solubility, and high-analysis (37% N) fertilizer. It was developed in the U. S. Department of Agriculture and is composed of the reaction products of urea and formaldehyde. The product has excellent physical properties as compared with the high-nitrogen materials commonly used. One application will supply the entire nitrogen requirements of long-season crops. Limited quantities are available as specialty fertilizer for turfs and ornamentals. Diammonium phosphate is a high-analysis material containing approximately 21 percent nitrogen and 53 percent available phosphoric oxide. It is water soluble and is one of the materials used in formulating liquid fertilizers and starter solutions. Several companies are producing this material and it is estimated that the annual production is approximately 20,000 to 30,000 tons. The third of the newer materials mentioned is calcium methaphosphate which contains approximately 63 percent phosphoric oxide. This material was developed and has been produced by the Tennessee Valley Authority. Production, in terms of phosphoric oxide, increased from 2,234 tons in 1939–40 to 34,907 tons in 1953–54. It is essentially a direct application material; 81 percent (28,289 tons) of the 1953–54 production was applied directly to the soil.

The trend in the superphosphate industry is to produce more triple superphosphate (45 percent P_2O_5) and less normal superphosphate (20 percent P_2O_5). Thus, in 1945 triple superphosphate accounted for only 7.8 percent of the phosphoric oxide produced as superphosphates as compared with 23.9 percent in 1954. Sizeable quantities of potassium chloride, the major source of fertilizer potash, were formerly marketed as a 50-percent grade. This grade has been almost entirely replaced by the 60-percent grade.

The fertilizer industry is adopting modern and improved techniques for the production of more economical high-analysis mixtures with better physical characteristics. The nitric acid or nitric acid-sulfuric acid treatment of phosphate rock is being used by at least two companies in this country for the direct production of mixtures. The featured products are 12-12-12 and 14-14-14 mixtures. Research in the Department of Agriculture has contributed significantly to the development of processes for the granulation of mixed fertilizers. Very few new fertilizer plants are constructed without granulation facilities and they are being incorporated in many of the older plants. The Tennessee Valley Authority has recently developed a continuous ammoniation process which is finding considerable application in the granulation of mixed fertilizers.

Fertilizer companies are now selling many

grades of fertilizer mixtures to the farmer in bulk and in some cases actually formulating the product to the farmer's specifications. The fertilizer is loaded on a truck, taken to the field and immediately spread. The farmer derives economic benefits from this practice.

Considerable interest is being displayed at the present time in liquid mixed fertilizers but their use is still quite limited. It is estimated that approximately 27,000 tons of liquid mixed fertilizers were consumed in 1953 and of this quantity about 22,000 tons were used in California. Such fertilizer solutions are readily applied either through irrigation systems or directly to the soil. Local oil distributors are beginning to use their fuel oil truck fleets during the off-season to custom fertilize city lawns with dilute solutions of fertilizers.

Recent improvements in application methods and equipment tend to make fertilizer application more flexible and convenient for the farmer. Application equipment for liquid fertilizers has been developed and is now readily available. In many localities custom applicators fertilize with liquid fertilizers or apply solid fertilizers by airplane. Metering equipment on lime spreaders has been refined to enable the farmer to use the same equipment for spreading bulk fertilizers. Multiple compartment distributors that are on the market make it possible to apply separate nitrogen, phosphoric oxide, and potash materials, either liquid or solid, in any desired ratio. The multiple-compartment spreaders enable the farmer to apply the most suitable ratio of plant nutrients to the soil and to readily change the ratio as the need arises.

Fertilizer technology in recent years has done a great deal to lighten the farmer's load. Higher plant-nutrient concentration tends to maintain the low-price level of fertilizers through savings in the cost of bags, freight, and handling charges per unit of plant nutrient. Granulation gives the farmer a product that is easier to drill and can be more uniformly applied. Liquid sources of nitrogen supply the farmer with low priced nitrogen which can be handled with little manual labor. The farmer saves when he buys bulk fertilizers because of the elimination of bags and reduction in handling charges while the purchase of separate materials for application in multiple-compartment distributors eliminates the mixing charges. Custom application is advantageous to the farmer because it relieves him of one task during his busy season.

Soil Stewardship Was Theme

Georgia ministers meet to plan the pulpit's part in helping the cause of soil and water conservation.

By GORDON WEBB

MERCER University, founded 122 years ago in a cottonfield and primarily intended to train rural ministers, continued its close association with the soil last spring when ministers from 30 central Georgia counties gathered there for a conference on soil and water conservation.

At this conference in Macon more than 600 people, most of them ministers, heard three leading Georgia clergymen ask that church congregations be inspired to soil stewardship.

The dependence of rural churches on productive land around them, and in turn the dependence of urban churches on rural churches to swell their congregations, was stressed by Dr. Louie D. Newton, pastor of Druid Hills Baptist Church, Atlanta, and American vice president of the Baptist World Alliance since 1937.

Dr. Newton, who preaches one sermon every year from a pulpit decorated with a plow stock and products of the soil, to remind his Atlanta congregation of its ties with the soil, asked for a show of hands of ministers reared on the farm. Nearly every minister raised his hand.

"Soil conservation is primary business," the Baptist leader said.

In reminding the clergymen of the church's obligation to the land, Dr. Newton recalled that Mercer was opened in 1833 as "a manual school for training ministers." The first gift toward founding the school was $2,500 from a Savannah, Ga., jeweler, Josiah Penfield. And the second gift, of $40,000, came from a minister-farmer, Jesse Mercer. With these donations and funds raised by Baptist congregations, 1,800 acres in Greene County were bought for the campus. The site was named Penfield for the jeweler; and the school Mercer for the farmer-minister. In 1871, Mercer was moved to Macon.

Dr. Cecil A. Thompson, professor of evangelism at Columbia (Presbyterian) Seminary, Decatur, emphasized that soil and water conservation are a community undertaking.

"A farmer can't practice conservation on his farm if the man up the creek does not also carry out the work," the Presbyterian minister said. "We are all dependent one upon another. It is true with the church as well as with the farm. All of us are in it together. To build a strong nation and a great people we must have a sound agricultural policy.

"This matter of conservation is bigger than we think. The word 'conservation' doesn't begin to cover what the conservationists are doing."

Dr. Thompson said that conservation on his own small farm is actually "transformation—almost creation." He declared that in the last 10 years, "You can see that a miracle has happened in Georgia, has happened all over the South—all over the country."

Bishop Arthur J. Moore of the Georgia Conferences of the Methodist Church, Atlanta, told the soil conservation district supervisors present: "We of the church are deeply concerned with what you are doing. The church must be concerned with a larger mind, a better community, and that is what you are building. This preacher believes your work is vital and indispensable."

Telling of his visits to the "hunger countries," the Methodist leader said the Chinese wasted their natural resources, became "poor and unhappy, and the communists found them fertile soil."

On campus at Mercer University: Supervisors A. L. Branan, Jack Peed, Houser Davidson, C. A. Duggan, R. F. Burch (chairman), M. T. Riner, and H. M. Simpson; at extreme right is Dr. Frank King, director of the Coastal Plain Experiment Station.

George F. Powers, president of the Georgia Association of Soil Conservation District Supervisors, appealed to the ministers for their help in conserving land and water resources. Explaining how districts are organized and governed by local farmers, Powers said: "We supervisors are paid in the same way and in the same amount as your board of deacons or board of stewards."

Supervisors of four central Georgia soil conservation districts and President George A. Connell of Mercer invited the ministers from 30 counties to the conference in preparation for National Soil Stewardship Sunday, May 15. Reports in June showed 787 Georgia ministers discussed soil stewardship before congregations totaling 80,525 people.

The conference ended after the ministers and other guests fully sampled some of the products of the land—typically good Georgia barbeque with all the trimmings.

The program was arranged by Dr. McLeod Bryan, professor of sociology at Mercer University; Rev. Guy Hutcherson, Methodist minister, Perry; and Frank T. Denham, field secretary of the Georgia State Soil Conservation Committee, Eatonton. W. F. Hall, a member of the State Soil Conservation Committee, of Sparta, presided.

Decade of Progress on the Plains

Where the winds blow and the soil is salty, conservation brings many problems to a happy end.

By MARTIN C. LUND
and MILFORD THOMPSON

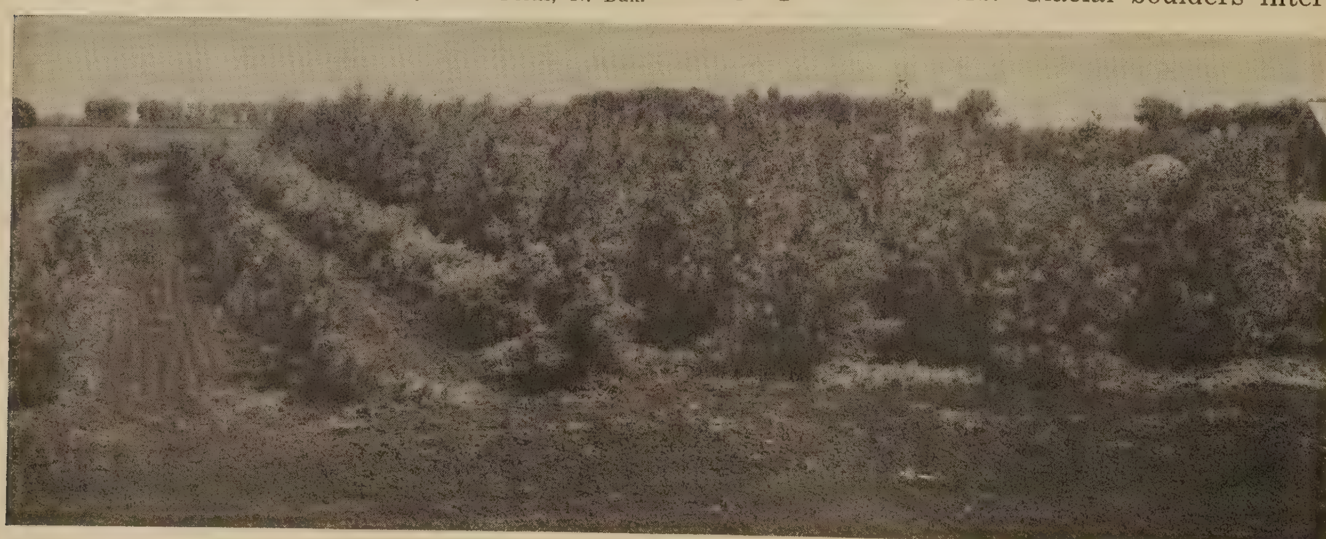
Conservation leaders happy over advances of past 10 years: Martin C. Lund, SCS technician; Joe E. Adams, supervisor; William R. Page, formerly county agent and now board secretary; George Johnson, supervisor; and Frank Dubuque, supervisor.

LYING west of the Red River of the North, the 19 North Dakota townships included in the Grand Forks County Soil Conservation District are all within the original basin of glacial Lake Agassiz. The district is now more than 10 years old. Soils vary from light sandy beach soils on the west edge, to heavy textured silts and clays along the river. About 200,000 acres —almost half the district—are affected by varying degrees of salinity. Some soils can be used only for native hay land and pasture.

The land is generally flat with many small depressions and ridges that tend to retard run-off of snowmelt and rainfall. Accumulation of moisture in these depressions has aggravated further the salinity condition of the adjacent higher ground. With nearly all of the district affected by this problem, the supervisors gave top priority to the establishment of outlet drainage systems. Since 1944 more than 200 miles of outlet and farm drainage systems have been constructed, requiring 1,200,000 cubic yards of excavation. These drains have benefited about 75,000 acres of agricultural land and put thousands of dollars of additional profits in the district cooperators' pocketbooks. Local contractors working in co-operation with district supervisors and farmers have done most of the ditching.

In 1947 the district purchased a crawler-type tractor and scraper unit to be used for jobs too small to interest the contractors. Since then it has purchased a special type rock digging rake, which it rents to cooperating farmers to remove large glacial boulders. Glacial boulders inter-

Note.—The authors are, respectively, work unit conservationist and conservation aid, Soil Conservation Service, Grand Forks, N. Dak.



Field and farmstead windbreaks on the flat lands of glacial Lake Agassiz are protecting soil and crops from damaging winds. In addition, feedlots and farmyards are protected from drifting snow.

Farm ditch newly seeded to alfalfa and bromegrass with barley as nurse crop. This ditch drains adjacent flat fields or potholes. When grass is well established, there is little erosion. A useful practice in combatting damage from flooding by snowmelt, spring and summer rains.

fere with cultivation on about 100,000 acres of land in the district. Thus far, district cooperators have removed rocks and nuisance trees from about 6,000 acres of farmland. Successful use of the rock rake has inspired local contractors to obtain similar machines to help remove field obstructions.

The district is relatively treeless. To obtain greater protection against the winds, district cooperators have been encouraged to plant farmstead and field windbreaks. In 10 years, 1,019 acres of trees have been planted for both field and farmstead protection. Planted in one row, they would make a shelterbelt 509 miles long. Farmstead windbreaks are especially valuable in this windswept valley as they protect against drifting snow and prevent the large drifts common in unprotected farmyards following severe winter storms. Much less fuel is needed to heat homes with well developed windbreaks. Care of livestock in tree-protected feedlots reduces costs considerably. Field shelterbelts protect open cropland from wind erosion during late fall and early spring months, as well as growing crops from hot summer winds.

Plantings in the district include fruit trees to provide the family its own supply of plums, crabapples, sand cherries, currants, Chinese cherries, and other fruits. Game and song birds thus find much food, shelter, and nesting cover in this valley.

Tillage practices to combat wind erosion are imperative. In this flat valley, with its heavy textured soils, most of the plowing must be done in the fall. Stubble mulch tillage has been encouraged, and hundreds of acres receive this type of conservation treatment each year.

Providing adequate stock water has been a problem for many farmers. Deep wells supply artesian water, but some are too salty for livestock. Wells have been permitted to flow uncontrolled without suitable outlets and have already ruined many acres of land. To provide needed stock water, many surface storage dugouts have been constructed in pastures away from farm headquarters, and many more have been constructed at headquarters, to provide water necessary for summer and winter use.

In the early days of the district, it was agreed that conservation education in the public schools was a necessary part of the district's program. The district supervisors sought the assistance of the bankers in the county to obtain money for cash prizes for interest-stimulating conser-

vation contests. About $1,000 has been furnished by the banks to finance five such contests in the past 10 years. These contests for 7th and 8th grade pupils have stressed conservation in such activities as essays, scrapbooks, jingles, and posters. The county superintendent of schools and the agricultural extension agent have been most cooperative in carrying out an effective education program. About 150 entries were received in last year's contest.

The Eastern Grand Forks County Soil Conservation District, in cooperation with the other district in the county, has provided scholarships to encourage teacher attendance at summer conservation courses and workshops. Twelve teachers in the county have been given $25 scholarships.

Further adult education in conservation is being accomplished through cooperation with local civic groups in farm tours, farm family night meetings, and special programs for urban groups. Use is also being made of our daily newspaper in featuring "success stories" of district cooperators. Then, too, our local radio stations provide time for monthly radio broadcasts by technicians of the Soil Conservation Service, our agricultural extension agent, the district supervisors, and others.

The supervisors feel that the district is serving its 407 cooperators well. The goal is a better place to farm and to live.

Camp School for Sixth Graders

By ROY E. BALLARD

AT Earl-Anna, the Burbank YMCA camp, located in a beautiful setting in the exquisite Tehachapi Mountains about 7 miles southwest of Tehachapi, Calif., conservationists for tomorrow were being developed. The occasion was the one-week, sixth-grade camp of the Tehachapi Elementary School.

Note:—The author is soil conservationist, Soil Conservation Service, Tehachapi, Calif.

John Horton, the camp director, was assisted by sixth grade teachers Mrs. Lola Oxford and Mrs. Gertrude Phelps, and by the vice principal, Thomas Feeney, as well as by some of the parents who spent the nights at the camp.

Before camp each pupil was given a medical

Frank Walker stresses importance of preventing fires.

examination. On Monday morning, the pupils were transported to camp by bus, and remained until Friday.

The boys were quartered in one camp, the girls in another, a short distance away. There were eight pupils and one supervisor to a shelter. Each pupil assumed certain responsibilities, such as keeping their camp clean, and helping in the mess hall. One day during the week the campers assembled in an outdoor classroom provided by nature. Here a team of specialists guided the youngsters in exploring the alluring subject of conservation of natural resources. It was a co-operative enterprise. The instruction was provided by the Kern County Fire Department, the Kern County Department of Agriculture, and the Soil Conservation Service.

Fifty-eight pupils were in class in addition to supervisors and leaders. During the morning session half of them were studying conservation while the rest were engaged in other activities. In the afternoon the groups exchanged places. Four conservation sites were selected for study. Four groups rotated from one site to another in sequence.

Gil Martinson, at area No. 1 explained the correct method of planting as each group of pupils actually planted a tree. Result: the youngsters learned, in the effective school of experience, that certain locations were better

Good cattle thrive on good pasture, as here on the Evern Youngberg dairy farm.

Gil Martinson shows youngsters how to plant a tree.

suited to the growth of trees than to the growth of other crops. They also learned that it was important to replant many exposed areas to prevent the loss of soil by water or wind erosion.

When the pupils moved to position No. 2, D. J. Vanderwal of the Soil Conservation Service helped them to get acquainted with the plants and trees that were growing around them. Soon they learned to recognize one tree as a pine and another as a fir. They were shown that trees differed, that some grew on high mountains and others in low valleys.

At site No. 3 sixth grade teacher, Mrs. Lola Oxford, and her pupils listened attentively to explanations made by Brad Krauter of the Kern County Department of Agriculture. After Brad showed them some of the insect pests common to local forests, they searched diligently under a few dead trees to see if they could find any of the insects that might have caused the trees to die. They came to realize the necessity of controlling insects to save forests.

Chester R. Ingrils, high school district superintendent, and Claude L. Wells, elementary district superintendent joined the group at location No. 4, as Frank Walker of the Kern County Fire Department pointed out what an important role each of them played in conserving the forests by applying safety rules to prevent fires. He convinced them that planting trees was only the beginning. Proper forest management and protection, he emphasized, were necessary to insure complete development.

Brad Krauter talks about tree-killing insects. Mrs. Oxford is at right.

An additional but not final chapter was written to the drama by the pupils themselves the following week back in the classrooms. There they made placards, wrote stories and prepared notebooks. Thus, each pupil recorded in indi-

vidual style the highlights of his or her experience at camp, preserving for the future the happy memories of that week in camp.

The degree of retention displayed by the boys and girls, on questioning 9 months later, was remarkable and thrilling. Said one: "It's necessary to keep hills covered by trees or other vegetation to prevent erosion." Said another: "It's important to plant trees on uncovered areas where crops won't grow." A third statement was: "It's desirable to keep streams clear to prevent floods."

Mrs. Oxford summarized the children's experience in these words: "The broad field of conservation was made forever more impressive and more memorable to the child who obtained a knowledge of the earth, sky, wind, and weather in the intimate, natural setting of a camp in the mountains."

BEEF AND CHRISTMAS TREES.—On their ranch near Eureka, Mont., growing Christmas trees has been a major operation of the Stoken Brothers for the past 22 years. They run beef cattle and do some logging but their favorite occupation is producing Christmas trees. The Stoken Brothers cooperate with the Lincoln Soil Conservation District.

The first Christmas trees were cut in 1932 when 5,000 bales (about 25,000 trees) were marketed. The price then was from 12 to 16 cents per bale and the cash return was around $500. In 1954, about the same number of trees were cut but the average price received was about $1.50 per bale with a gross income of about $7,500.

—William D. Shelley

HE GREW A HOUSE.—The William Cumming farm, near Camino, Calif., contains not quite 140 acres. What isn't in well-managed orchard, is in an 80-acre forest.

A few years ago the Cummings wanted a new house. This entailed SCS technical assistance and the use of the portable sawmill owned by the El Dorado County Soil Conservation District. A fine, modern, and spacious house resulted and the woods are in better shape than ever to grow another crop of wood.

SUITABLE INCENTIVE.—The Bennett County (S. Dak.) Soil Conservation District, recently appropriated the sum of $32.50 for 26 subscriptions to Soil Conservation Magazine which are being presented to entrants in an essay contest conducted by the district. The announcement came in a letter from Lawrence Petersen, treasurer.

Scaling trees on Round Grove ranch.

TREE HARVEST ON RANCH.—In 1954 Frank O'Connell, owner of the Round Grove Ranch Company and a cooperator of the Broadwater (Mont.) Soil Conservation District, requested assistance in connection with Douglas-fir stands on his 10,000 acres of woodland and grassland.

Soil Conservation Service technicians recommended that mature trees be harvested so as to release younger and healthier trees. A mill was set up. Mature timber will be harvested over a 7- or 8-year period. There is year-round employment for eight men. Lumber is sold rough and planed at nearby markets.

—Clayton E. Ogle

HABITUAL WINNER.—Peden Gaston, a cooperator with the Spartanburg (S. C.) Soil Conservation District, was recently presented a Balanced Farming Award by the South Carolina Extension Service. Gaston has developed and applied conservation practices on his whole farm, with the assistance of SCS and other technicians.

Gaston also has been a regular winner of soil conservation awards. In the 1951 soil conservation contest sponsored by his district he won first prize for "best job of conservation farming," for "best strip rotation," and "best woodland management." Likewise, his community—Green Pond—won first place in the same contest.

REVIEWS

OUR NATIONAL FORESTS. By Bernard Frank. 238 pp. Illustrated. 1955. Oklahoma: The University of Oklahoma Press. $4.

THIS is a story to be read with pleasure and pride. It is the story of the American forests—their character, their beauty, their intrinsic value to the Nation, and the responsibility we all bear to them.

Every page lives and glows. The author is there walking the forest trails with a pack on his back. And with him moves the great tradition of the U. S. Forest Service, mighty battler for our tree-studded public domain.

This is an exceedingly well-written book. The author is forthright, skilled in perspective, and he does not strain for effect. He meets controversy head-on without bigotry. And he *informs*. Surely, there has not before appeared between two covers so complete an account of our National Forests—their location, their extent, their purposes, their uses, their composition. Whoever seeks the refuge of woods and wildlife and mountains will be grateful for Bernard Frank's 40-page "National Forest Recreational and Scientific Resources" which constitutes Appendix I at the back of the book.

The chapter headings are a fair indication of the content: How It Came About, Profit, Pleasure — and Something More, Within These Borders, Ten Thousand Loyal Servants, and Questions for the Future.

Photographic illustrations are well chosen and widely representative. At the front of the book is a two-color line map which indicates the annual runoff in the forests and which tends to establish a conservation consciousness which projects itself from beginning to end. For Bernard Frank is at least as much a conservationist as he is a forest technician. Every chapter, nearly every paragraph, speaks for the stewardship of soil and water.

Frank dwells much on the policy of "multiple use"—a policy which "encourages the sale of commercial timber to private enterprises, sheep or cattle grazing by farmers and ranchers, and other uses consistent with the need for protecting the watersheds against erosion and muddy water flows. It encourages favorable fish and wildlife conditions. It provides for roads and trails to reach forest fires quickly, and to permit readier access to the forests by loggers, hunters, and fishermen. It promotes the development of picnic, camping, winter sports, and summer home sites. Right of ways are also furnished for irrigation canals, county or state highways, electric power lines, gas and oil lines, and sites for hydroelectric power plants and other water developments. The forests are also subject to mineral exploitation under federal laws enacted long before the Forest Service was established, and at a time when public concern over doubtful mining claims and unnecessary damage by mining had not yet crystallized."

Justice William O. Douglas wrote the foreword. "This volume," he says, "gives a rounded account of what is happening to our topsoil the nation over. It tells what the United States Forest Service is doing about it. It shows how communities, large and small, can aid in conservation measures and, with planning, avoid the desolation to which they are presently doomed."

—WELLINGTON BRINK

LAND JUDGING. By Edd Roberts. 120 pp. Illustrated. 1955. Oklahoma: The University of Oklahoma Press. $2.50.

IT has been my privilege to observe first hand the development of land judging as an educational method for increasing knowledge about the use and treatment of the soil. Edd Roberts is a recognized leader in this land judging development, a leadership which grew from the conviction that a technique comparable to livestock judging would be effective and from an intensive personal experience in supervising land judging events in Oklahoma. He was presented a superior service award from the U. S. Department of Agriculture in recognition of his work in the development of this method.

In a simple forthright manner, "Big Edd" discusses the importance of soil, how to judge land by physical characteristics, the land judging score card, the conduct of land judging contests, and the aid and stimuli that make land judging successful. Simplicity of presentation

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is always seen in the language and visual aids which he uses in the field himself.

Land appreciation schools and land judging are popular now everywhere. Although exact figures are not available we believe that more than 100,000 people participated in such schools in 1954 and the method is in use in at least 30 states.

It should be pointed out that the principal values of land judging are gained where actual land use and treatment can be applied to local farms and ranches. The lively interest in state, regional, and national land judging contests indicates that these events add glamour. As one extension soil conservationist remarked after observing the intense interest of a group in land judging: "The only other thing that would draw more interest would be a good dog fight."

This book will have its greatest value, I believe, as a reference in carrying out the local land judging events.

—W. R. Tascher

APPROVED PRACTICES IN SOIL CONSERVATION: By A. B. Foster. 380 pp. Illustrated. 1955. Danville, Ill. The Interstate Printers and Publishers $2.40.

HERE is a strictly brass tacks book: practical, usable, understandable. It deals with the techniques of planning, laying out, and applying accepted soil conservation practices. And it is the kind of book that intelligent farmers themselves can put to work. It is also convenient and reliable as a guide for teachers and leaders of field parties. Adding to its effectiveness as a manual is the fact that, although the book is in printed form it is equipped with a looseleaf binding which enables it to lie flat on a surface.

Approved Practices is condensed, thoroughly illustrated with halftones, charts, tables, and diagrams, and it is supported by both table of contents and index. The text is pared to a discussion of essentials. Best of all, it is sound and authoritative, the output of a veteran in the Soil Conservation Service.

The author wisely states: "You should remember that many soil conservation practices require the help of men with specialized training and experience. I have tried to point out where this kind of help is needed as well as to describe those practices that you can handle under the supervision of your teacher. I have tried to present some of the difficult jobs and have suggested how far I think you can go and when you need the help of a specialist."

He mentions, too, that many things are being learned all the time about soil and water conservation—and that what is accepted today may be outdated tomorrow.

—Wellington Brink

POST PRESERVATION.—In the big open sagebrush and grass area of the Great Divide Soil Conservation District in northwestern Colorado fence posts are scarce. The source of juniper posts for this district once was about 50 miles away, now it is twice that far. In the mountains to the east, about 40 miles distant, are areas of aspen and pine. Posts from these species don't last very long without treating. In 1940 the SCS woodland conservationist, in western Colorado suggested trying to treat aspen posts with zinc chloride. A CCC side camp cut several thousand aspen posts, and while they were still fresh and green treated them with the "tire tube" method. These posts were used for many miles of fencing.

Last summer a check was made on the treated aspen posts. After 14 years, they were found to be 99 percent sound. Ponderosa pine or lodgepole pine posts, which are just as close as the aspen, would have done as well if they had been treated with pentachlorophenal ("penta"). Aspen has been considered worthless in the past because no markets existed for it in this area. Some folks are now beginning to wonder if it is really so worthless, after all. Preservative treatment of aspen and pine is moving the sources of fence post material closer to this soil conservation district.

—Wilfred S. Swenson

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

WELLINGTON BRINK
Editor

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OUR SOIL ★ OUR STRENGTH

HORSES AND CONSERVATION.—Although USA's farm horse population dropped 800,000 between 1954 and 1955, equine employment remained steady in many areas where the lush grasses of soil conservation farming are increasing in use.

For example, densely populated New Jersey has maintained 7,000-horse prosperity during the past year, feeding mainly on grass, legume, and small grain seeded on fields to restore soil vigor and moisture.

Horses are still useful in New Jersey. One acre of grassed waterway yields enough hay to support one horse a year.

Chief mainstay of the horses, however, the permanently sodded waterways, terraces, outlets, and pond spillways. Mowed regularly to hold down weeds and prevent erosion, they mean plenty of high quality hay for Ol' Dobbin. Garden State farmers look warmly at this as another "conservation extra."

(Continued on page 82)

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—Harvest scene on the farm of Lester Dodson, Sperryville, Va.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Flood Program—How Effective?

Figure 1.—Flood plain on Sandstone Creek, Okla., 4,700 acres. The Hammon flood of 1934 inundated the entire flood plain.

By H. N. HOLTAN

MANY PERSONS may have wondered just what the Department of Agriculture's flood reduction program is all about. This article is intended to provide a brief summary of the Department's responsibilities in this program, the methods it is using in attacking the flood problem, and some evidence of the effectiveness achieved.

Public Law 566 became effective August 4, 1954. It authorized a permanent program by which the Department of Agriculture provides technical and financial assistance to local watershed groups willing to assume responsibility for initiating, carrying out, and sharing the costs of upstream watershed conservation and flood control. The Soil Conservation Service was designated as the action agency with primary responsibility for the Department's cooperation with local organizations in small watersheds throughout the nation.

The Service, of course, has been working on phases of flood control since the Omnibus Flood Control Act of 1936, and under the Flood Control Act of 1944 (Public Law 534) it has been applying special treatment for flood control on 11 watersheds embracing nearly 16 million acres of farmland in 12 states. The operations there are carried on in cooperation with soil conservation districts and other local and state organizations. The Service also has been conducting investigations on other watersheds in cooperation with the Forest Service, to determine whether flood control measures would produce benefits in excess of costs, and to develop remedial programs.

Flood reduction programs, as laid out by the Soil Conservation Service, are aimed at (1) proper land use and treatment, and (2) the controlled conduction and discharge of runoff water.

Land use and treatment measures are planned in accordance with the Service purpose of achieving "the use of each acre of agricultural land within its capabilities and the treatment of each acre of agricultural land in accordance with its needs for protection and improvement." The effect is to increase the economic returns of a farm and at the same time reduce erosion and sedimentation damages downstream.

Runoff flows are controlled, safely conducted, and discharged from the watershed by a care-

Figure 2.—Detention reservoirs installed on Sandstone Creek, Okla.; completed in 1951.

Note.—The author is a hydraulic engineer, central technical unit, Soil Conservation Service, Beltsville, Md.

fully designed combination of detention reservoirs and channel capacities. The system functions like an undersized road culvert beneath a high fill because runoff water is held in the reservoir and released at a predetermined rate through tubes passing through or beneath the dam. The release rate is selected according to the in-bank capacity of the downstream channel. Sometimes it is feasible to increase the capacity of the channel by straightening, by enlargement, by levees, or by other means. Occasionally, a detention reservoir may even be eliminated or cut down in size by substitution of a greater release rate. This is a limited practice, however, since speeding the flow through a section of stream may cause overloading and flooding at some point downstream.

To eliminate all flooding, the location, size, and release rate of reservoirs in a system must be kept in balance with downstream channel capacities. Economic balance imposes a further consideration upon any flood-reduction program. It may not be economically justifiable to eliminate all flooding. Areas having small potential value would not justify important expenditures for protection. Furthermore, there is a point of diminishing returns which determines the maximum size storm for which complete protection should be provided. Although damages multiply as storm-size increases, the recurrence interval may lengthen out until it finally becomes so great that the value of protection fails to justify the increase in cost.

Three questions present themselves prior to planning a program:

1. What type and amounts of precipitation should be anticipated?
2. What volumes of runoff will be produced by each precipitation?
3. What peak flows will result?

When these have been satisfactorily answered, only one other question remains: What combination of measures will afford the most protection with the most favorable ratio of benefit to cost? This may appear to involve pure speculation but actually there is a considerable amount of factual information on which to base our calculations. Procedures are by no means simple, but the rudiments of our determinations can be stated briefly for watersheds where rainfall and streamflow records are available.

The U. S. Weather Bureau records of past precipitation (or records from other reliable sources) are studied to determine the average recurrence interval of various types and amounts of rainfall for an area. Just as insurance companies base their expectancies on past experience, so hydrologists base their anticipations of future storms on the records of past precipitation.

The U. S. Geological Survey records of streamflow are studied to determine the average relationship between amount of precipitation and volumes of runoff. Peak rates of flow are also correlated with precipitation from these same records.

At various points on the stream, within the watershed, peak flows and areas inundated are determined from highwater marks of the more recent floods. These marks are obtained and substantiated by personal interviews with local residents, by visible evidence, and by mathematically routing various flows through the channel system. Thus, the average relationship between peak flows and areas inundated is determined.

These relationships permit estimates of the area inundated, if any, by each precipitation and, subsequently, the extent and average recurrence interval of such inundations to be expected in the future. Economic and agricultural surveys of the flood plain are applied toward the evaluation of damages from inundations expected at various frequencies.

Various combinations of detention reservoirs and channel works are considered as to their individual and combined effect upon downstream flows and damages. The average annual cost and the average annual benefits (damage reduction) of each combination are compared. Generally, the program is developed to that degree of control where further measures to reduce damages would result in uneconomical additions to the cost. Quite often it is not possible to arrive at this exact point due to unavailability of needed reservoir sites and easements, and to economic limitations.

Have any of these flood-control programs been tested in operation, and did they prove out as planned? The Soil Conservation Service is

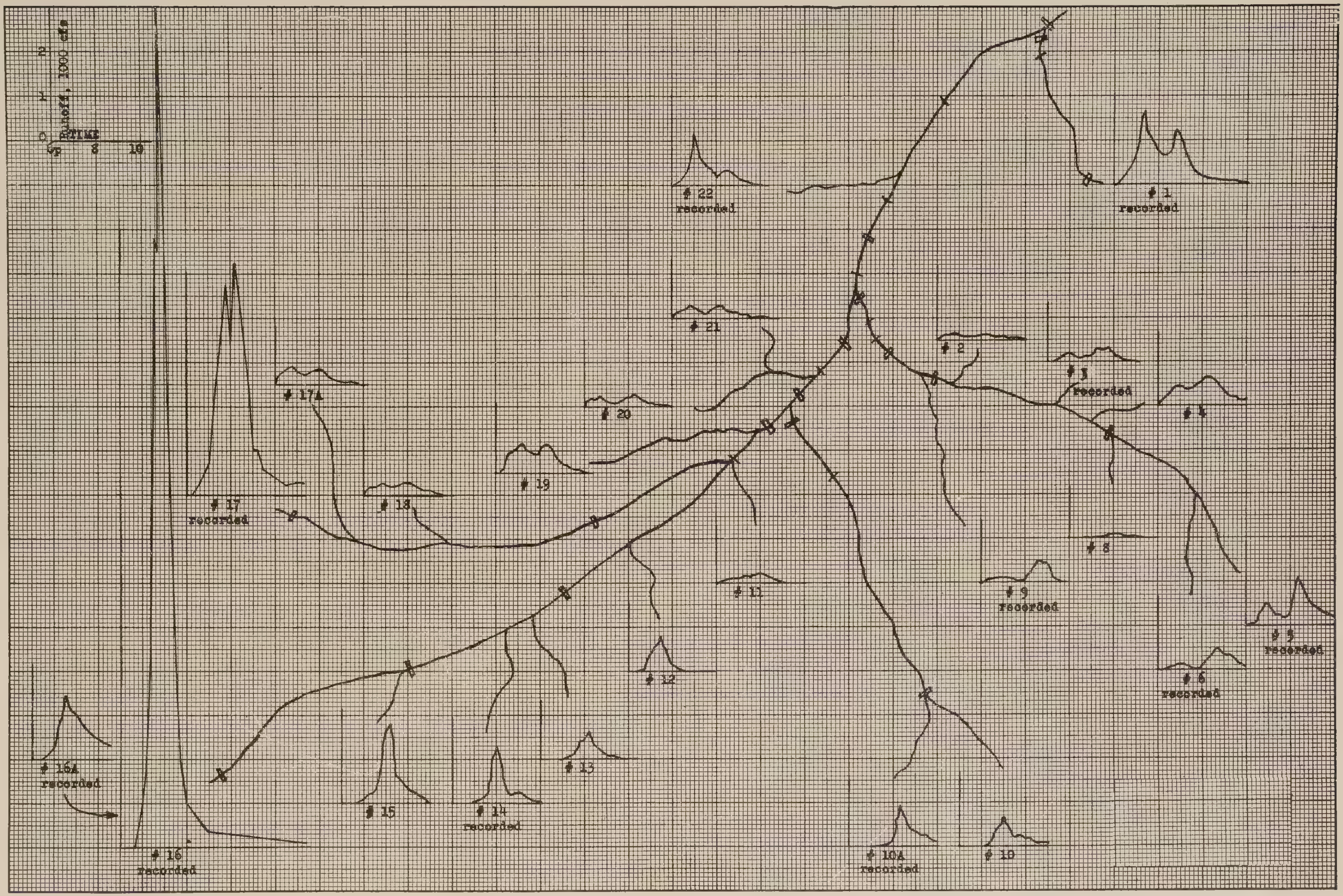


Figure 3.—Hydrographs of inflow to reservoirs during the storm of May 23-24, 1954.

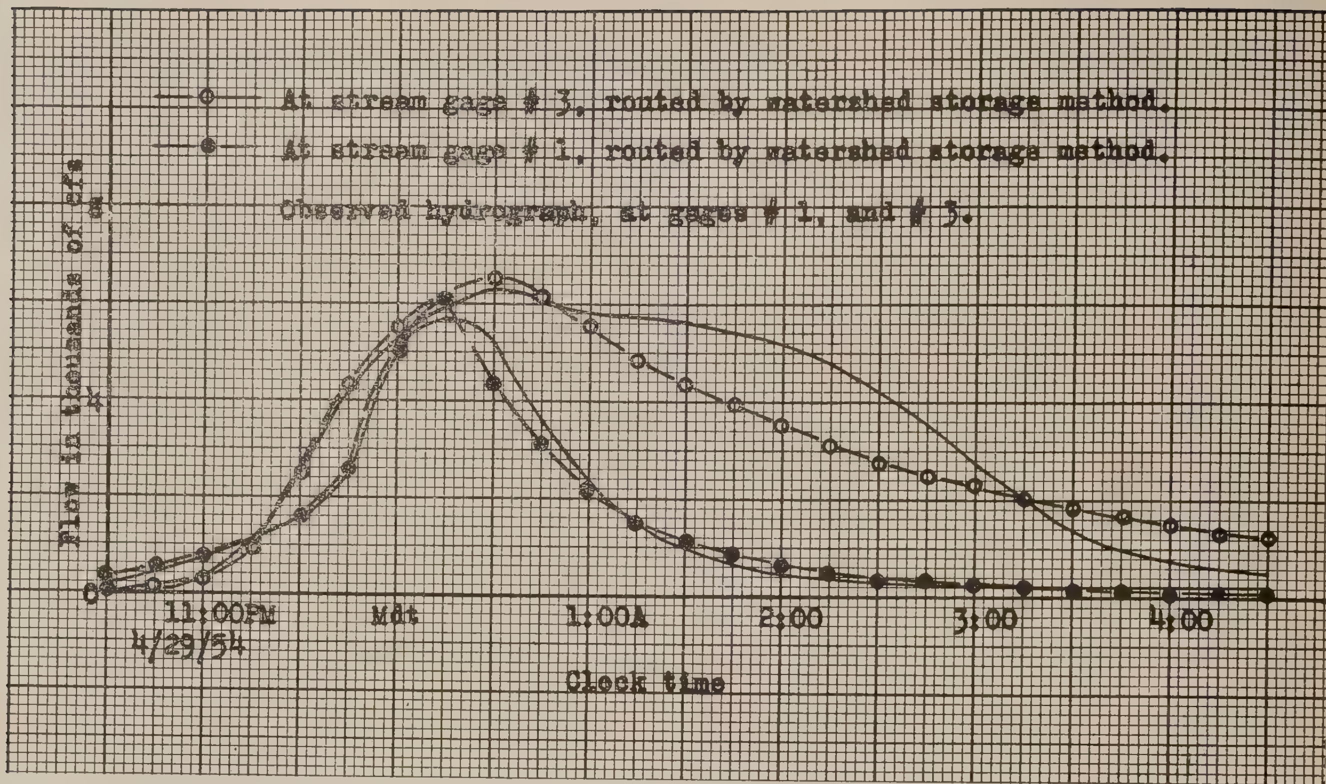


Figure 4.—Comparison of derived hydrographs with actual hydrographs for the storm of April 29-30, 1954 with reservoirs.

intent on obtaining dependable evidence of the validity of its flood-reduction planning procedures. Selected watersheds upon which flood-reduction programs have been installed were equipped with recording instruments to permit detailed determinations of rainfall, runoff, and inundations over the entire watershed. Sandstone Creek in Oklahoma is one of the watersheds thus equipped.

Sandstone Creek lies within a rectangle formed by the towns of Sayre, Elk City, Hammon, and Cheyenne. It flows in a northearterly direction for 15 miles. It enters the Washita River about 8 miles southwest of Hammon. The watershed varies from 2 to 11 miles in width, averaging about 6 miles. It has an area of 65,013 acres, all of which is in farms or rangeland. There are 4,700 acres of flood plain. (Figure 1.) The Sandstone vicinity is characterized by high intensity rains in spring, summer, and fall. Average annual rainfall is 25 inches, approximately 30 percent of which comes in May and June and 11 percent in September. On the average, 79 percent of the annual rainfall comes during the growing season of April to October.

During 20 years, 1920 through 1939, flooding occurred 184 times—an average of 9 times per year. Damage ranged from slight for small floods to disaster proportions in the 1934 flood when the entire flood plain was inundated. This period included the great drought of the early thirties and three spectacular floods. In the Hammon flood of April 1934 the Sandstone Creek watershed received 11 inches of rainfall with 8 inches falling in 2 days.

The flood reduction program on Sandstone Creek was completed in the early fifties. The program consisted of proper land use and treatment measures, channel improvements and stabilization measures, and 24 detention reservoirs located as shown in Figure 2. Through the use of stage recorders, records of inflow and outflow were obtained on 11 of the 24 reservoirs and records of streamflow were obtained at 3 strategic points in the channel system. Crest gages were installed to permit accurate determinations of maximum stages and subsequent inundations along the entire length of the flood plain. These installations were designed to provide accurate measurements of what actually happens during a

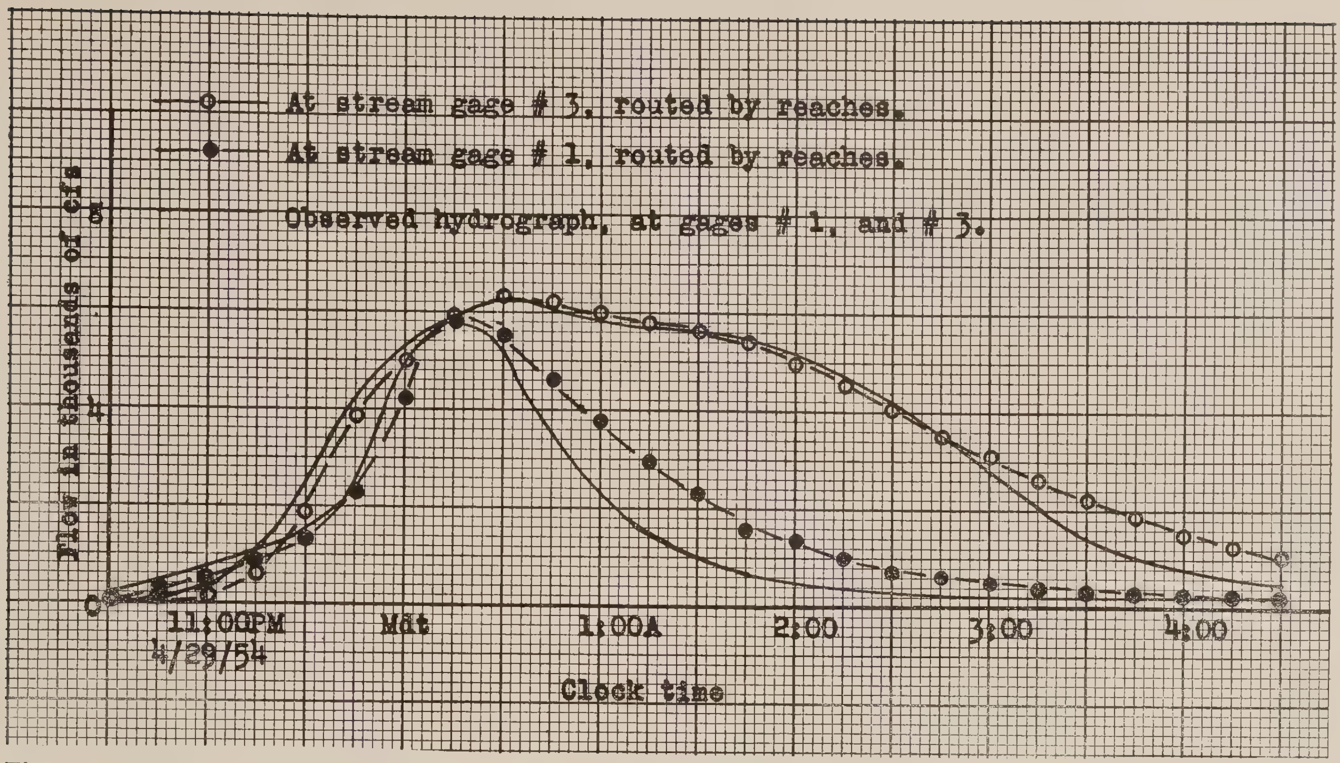


Figure 5.—Comparison of derived hydrographs with actual hydrographs for the store of April 29-30, 1954 with reservoirs.

storm. They were also designed to provide data on rates and volumes of runoff produced on various portions of the watershed. Such data provide factual bases for determining the flows and subsequent inundations which would have occurred if the program had not been installed.

Following 2 dry weeks, the Sandstone watershed received an average of 4 inches of rainfall on April 25, 27, and 29, 1954. The heaviest storm was on the 29th. A succession of rains totaling about 3.4 inches came during the first half of May. Then, on May 23 and 24, an average of 4.36 inches fell. The storms of April 29 and May 23 were of such intensity and magnitude that severe flooding would have been expected if the flood reduction program had not been in effect.

Speculation ran high during these heavy storms. Local venerables began to draw comparisons with the "big one" of 1934. Farmers who had planted flood plain lands to high-value crops on the strength of the flood reduction program watched anxiously and with fingers crossed as the downpour continued. At the cessation of each storm, the Sandstone was a beehive of activity. Farmers viewed their fields to check on damages, news reporters came out for pictures and stories, and curiosity drew many others. Soil Conservation Service technicians were busy running various fact-finding surveys. Employees of the U. S. Weather Bureau and U. S. Geological Survey collected records of rainfall and runoff.

Local interests were pleased to learn that the April storm had flooded 588 acres and the May storm only 200 acres. Soil Conservation technicians dug out the original estimates prepared during the development of the program's plan. Original estimates for storms of these sizes were: 410 acres inundated for the April storm and 310 for the May storm! The errors were trifling and well within the limits of human frailty—but why was the April estimate too low and the May estimate too high? Post-storm surveys had indicated a serious logjam at one of the road bridges during the April storm. This had backed up some water. Rainfall records indicated a concentration of rainfall on those areas lying below the reservoirs. Conversely, during the May storm concentrations of rainfall occurred above the reservoirs, thus affording the moderating influence of reservoirs to more than the average portion of runoff. The early estimates had of necessity considered only *average* rainfall distributions.

Reservoir No. 17, Sandstone Creek, April 30, 1954. Potential flood water is held behind the earthfill dam and released (below) at a controlled rate of flow which can be carried in the stream channel.

But they came amazingly close to reality!

Speculation returned to what might have occurred if the flood reduction program had not been installed. Popular opinion ranged from high to fantastic. The program work plan was again consulted. It had been estimated that with conditions as they existed on the watershed before the program was installed the April storm would have flooded 2,160 acres and the May storm 2,110 acres. These figures indicated that 1,572 acres (2,160-588) were protected from flooding during the April storm and 1,910 acres (2,110-200) during the May storm.

Noting that the unequal distribution of rainfall caused small errors in the estimates of flooding, technicians wondered if this would cause more serious errors in estimating the much greater flows to be expected without the program.

Records of rainfall and runoff during these two storms now provide a factual basis for determining the rates and amounts of runoff produced on various portions of the watershed. Hydrographs of these flows during the May storm are plotted in their relative areal position on the schematic sketch of the Sandstone in Figure 3. If the reservoirs had not been constructed, these flows would have passed unrestricted into the stream channels. Their influence on streamflow together with that of similar flows from areas below the reservoirs, can be quite accurately determined by a mathematical calculation commonly referred to as "flood routing."

One can readily see that a stream must have water in it before flow can occur and that the rate of flow increases as the depth and volume of water in the channel increases. Essentially, there exists a relationship between the volume of water in a section of stream channel and the rate of flow of water through the channel. This is referred to as the detention-flow relationship. The relationship can be computed for sections (reaches) of the stream from physical measurements of the channel, or it can be derived for the entire watershed drainageway by analyzing hydrographs of flow from some storm. Both methods were used to route the flows of the April and May storms on Sandstone as a check on each other and on the original estimates.

Flows entering the channel from various portions of the watershed are proportioned mathematically to flow through the channel and to detentions needed to produce such flows according to the detention-flow relationship. As a check on the flood-routing procedures, each method was used to route reservoir outflows recorded during the April and May storms, together with flows from areas without reservoirs to see if the resulting streamflow hydrographs agreed with those recorded by the U. S. Geological Survey at three different points in the channel system.

In Figure 4 it is evident that routing flows through successive reaches satisfactorily reproduced the hydrograph recorded by USGS at stations No. 1 and No. 3. The single routing method using one detention-flow relationship for the entire watershed also gives hydrographs which compare favorably with recorded flows as illustrated in Figure 5. The comparisons at station No. 2 were equally close but peak flows were too small to provide good illustrations.

On the strength of the accuracy implied by these comparisons, each method was used to route runoff hydrographs from various por-

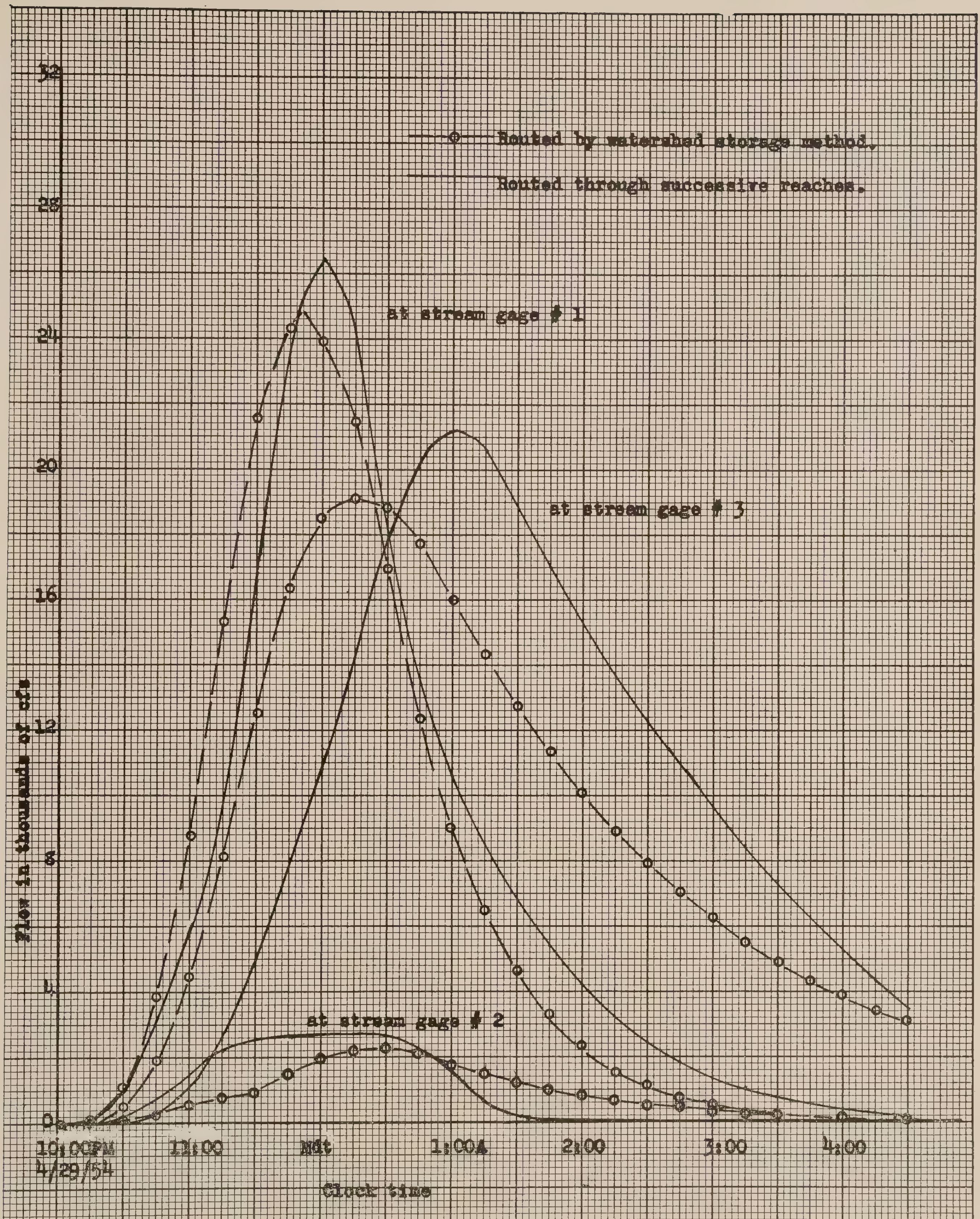


Figure 6.—Hydrographs which would have occurred during the storm of April 29-30, 1954 if the reservoirs had not been installed.

Figure 7.—Approximate areas which would have been inundated by the storm of April 29-30, 1954 on Sandstone Creek, Okla., if the detention reservoirs had not been installed.

tions of the watershed directly downstream without passing through the reservoirs. The resulting hydrographs at each of 3 gaging stations are plotted in Figure 6 for comparison of the 2 methods of routing. Although there is a discrepancy in time of occurrence, the peak rates of flow are not greatly different.

These two methods were then used to compute maximum stages and areas inundated at various points on the flood plain. The results are compared with original work plan estimates in Table 1.

Table 1.—Areas which would have been inundated without reservoirs as estimated by three methods

Method used in estimating	Area inundated	
	April 29	May 23
Method used in original work plan	2,160	2,110
Routed by successive reaches	2,461	2,370
Watershed detention storage method	2,335	2,259
Average	2,319	2,246

The discrepancies are not alarming. If confirmation is derived from consistency, these estimates of what would have happened without the program should be fairly reliable. Computed inundations which would have occurred during the April storm without the program are approximated in Figure 5. The May storm would have produced slightly different results, but the differences would be difficult to illustrate on such a small scale.

Some general concepts of the functioning of this flood-reduction program can be obtained by comparing Figures 1, 2, and 5. Figure 1 illustrates the area which was flooded during the 1934 flood, Figure 2 indicates a complete protection by reservoirs, and Figure 5 approximates the areas which would have been flooded by the April and May storms of 1954 if no program had been installed.

This article reports results obtained on Sandstone Creek watershed. Other watersheds spotted over the nation have been similarily treated and equipped with recording instruments. Should a flood-producing storm occur on one of the treated watersheds, the records obtained will be studied and analyzed to verify or improve on the technical methods so vital to successful flood reduction programs.

CURVING ORCHARD.—The first orchard on the contour in the Franklin Soil Conservation District is the work of William W. Hamilton, who farms near Athol, Mass.

Hamilton had an abandoned 9-acre field that he wanted to put to work. To prevent erosion caused by water flowing down from higher land, he built a 400-foot diversion terrace with tractor and plow. An SCS technician laid it out. He seeded the terrace to a sod-forming grass so that it would carry water safely around the field.

With the diversion terrace established, Hamilton last spring laid out 2 acres of the 9-acre field in contour rows. He planted pear trees and small fruits. The rows hold rain long enough for it to sink into the soil where it can be used by the trees.

Hamilton plans to build a 1,200-foot diversion terrace soon and to contour the rest of the field.

—Edward G. Konieczny

HORSES AND CONSERVATION

(Continued from page 74)

Nurserymen say horse-cultivation offers less hazard to valuable plants. Truck gardeners value the animals for "stop-and-go" field work.

More grass may save the horse from becoming a zoo oddity. Only 3 million of them are still working for American agriculture.

Chalk-Talker for Conservation

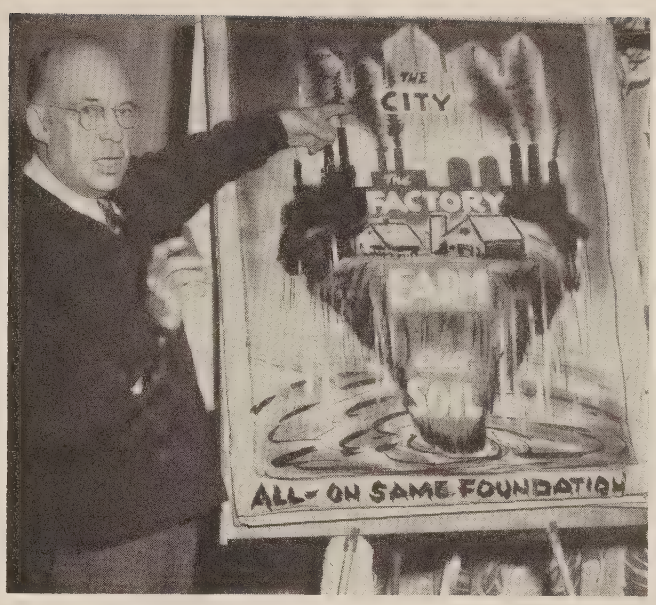
"Anybody here seen Kelly?" asked a manufacturer's representative following a knife-and-fork meeting in Minneapolis. "If not, you've missed something—he's in a class by himself."

THIS sentiment has been echoed for so many years that it seems important to make mention of this man in SOIL CONSERVATION Magazine, along with other forces making for an understanding of land problems in our Nation.

Tom Kelly was a newspaperman, art director, and cartoonist in St. Louis and Minneapolis. But more than 20 years ago he graduated to the broader field of conservation. Always a lover of the land, he was too distressed with the abuses he saw in forests and fields to confine his special talents to a city studio. For a time he was with the Minnesota Department of Conservation. For several years in the forties he served on the educational staff of the Soil Conservation Service in the midwest. Even here he found it impossible to do his labors quietly and unobtrusively in office or classroom. People were always urging him out to "make a speech." Kelly—Irish though he undoubtedly is—found it impossible to talk without using chalk and arm motion, a big sheet of paper and fervent enthusiasm. It soon became apparent that that suited his audiences first rate—it was the informal chatter *plus* the clever drawings that intrigued them!

The demands finally became so repetitive that Kelly at last gave up to the inevitable. He kissed his job goodbye and admitted he might just as well devote his whole time to telling his message to civic clubs, schools, and conventions wherever the cause of conservation was waiting for a spark to be struck.

Tom Kelly, who makes his home in Milwaukee, has been ranging the country ever since, with speaking dates that have carried him from one end of the country to the other. His jaunts now have totaled something more than a quarter million miles. At each stop he



Chalk-talker at work.

has put his idea across by drawing a few lines, raising his eyebrows, rolling his eyes, gesturing with chalk-smudged forefinger, even interrupting himself to tell a story. He likes to regard himself as "a vehicle to carry a sound philosophy of conservation."

Wherever Kelly has been "seen" he has left a trail of new adherents to the cause of soil, water, forests, and wildlife.

OUTDOOR LABORATORY ASSURED.—The campaign to purchase and preserve the unique, virgin tract of native hardwood timber known as Mettler's Woods near New Brunswick, N. J., went over the top when the United Brotherhood of Carpenters and Joiners of America contributed a check for $75,000. William Cole, secretary of the Citizen's Committee for the Preservation of Mettler's Woods, said that the surplus would provide a "captial fund for maintaining and operating the tract . . . considerably larger than originally planned." The 136-acre area will be administered by Rutgers University as an outdoor scientific laboratory.

EFFECT OF NITROGEN.—Oklahoma wheat responds well to nitrogen fertilization, according to Eck and Stewart of the Oklahoma Agricultural Experiment Station. Significant increases in yields were obtained with applications of nitrogen at rates up to 80 pounds per acre. The most economical rate, 40 pounds per acre, gave an average increase of 10 bushels per acre at 7 of 8 locations in western Oklahoma.

Working Shoulder-to-Shoulder in

HERE'S a story that tells how farm people and their local, state, and national agencies are working together to solve many a problem of land use and soil and water conservation. It's a story that's typical of what is going on just about everywhere in our States and Territories. It comes from Maryland, where soil and water problems have confronted landowners since the very first settlements in 1631. Early accounts here recognize the silting of streams and bays which impaired boat traffic, the ravages of droughts and floods, the depletion of soil fertility, and other problems of the land which have a familiar ring today. These problems certainly are not new, but the technology and the methods people are using to cope with their situations are strictly modern.

BY
JOHN
W.
BARNARD

Maryland was one of the first states to enact district enabling legislation. That was in 1937. In the 18 years that have followed remarkable progress has been made in the conservation of soil and water resources. Cooperation and teamwork are as much responsible as the improved technology.

Maryland is one of the smaller states. It contains less than 1 percent of our country's farms and farmland. It does, however, hold an unusual variety of land and water problems which call for a wide range of answers. For example, on the coastal plains of the Eastern Shore the drainage of land suited for agricultural use is of high importance, together with correct maintenance once such land is drained.

Combining spring oats in contour strip on farm of Andrew J. Young, Harford County, Md.

Here group cooperation is essential to success. Broiler production is a leading enterprise, which poses its own special questions. Cultivation of high quality tobacco on short, steep slopes in southern Maryland makes erosion control imperative. Dairying, livestock raising, and general farming predominate in the Piedmont Plateau and the Great Valley; here attention must be given to erosion control and water conservation on cropland, and to pasture improvement and management. In the westernmost counties good land use, cropland conservation measures, pasture and woodland management press for attention. Drought experiences have whipped up interest in supplemental irrigation throughout the State.

Thus we catch a glimmer of a few of the major problems which confront even a small state, and begin to see the need for local pro-

Note.—The author, formerly State Soil Conservationist, is head, conservation needs section, SCS, Washington, D. C.

he Old Line State

asture improvement and cropland conservation are paying handsome dividends on thousands of Maryland farms.

grams adapted to local conditions. Supervisors of the soil conservation districts have taken the lead in developing and carrying out imaginative conservation programs with technical and financial help from many institutions and many units of government. Perhaps the degree of cooperation required for group drainage is greater than for some other conservation activities. For that reason a brief explanation of group drainage work may be of interest.

The State's drainage law was revised in 1941 to provide a fairly simple method of organizing tax ditch associations. These associations have tax powers, the right of eminent domain, and other features which enable them to function effectively. Eighty-three group drainage enterprise jobs have been planned by Soil Conservation Service technicians assisting soil conservation districts.

County agents and the extension drainage engineer have done much of the organizational work. County commissioners have aided many times by direct financial assistance, by necessary highway or bridge relocations, and in some counties by providing draglines and other heavy equipment. Of course, the local landowners bear a large part of the cost. Agriculture Conservation Program Service cost-sharing has aided greatly on individual farm drainage work, as well as by pooling agreements on small group jobs. Almost 300 miles of ditches have been excavated, involving several million cubic yards of earth. *Wet lands better suited for waterfowl or other wildlife never are recommended for drainage. There are about 300,000 acres of such land of which two-thirds has moderate to very high value for waterfowl. Where areas suitable for waterfowl have been involved adequate measures for protection of the birds have been taken.*

An outstanding example of one group operation is the Pocomoke River Project, one of the largest drainage enterprises which SCS has assisted. As early as 1840 the Maryland Legis-

Hedge planting is one of the many practices to encourage wildlife which are an essential part of a good conservation program.

lature passed the first "Act for clearing out the Pocomoke by means of a lottery." The job still had not been done by 1912 when the legislature appropriated $250,000 for dredging the river—a measure that was vetoed by the Governor. This work was finally completed, however, in 1946 through the efforts of the Wicomico and Worcester County Commissioners, the Pocomoke River Tax Ditch Association, the State of Maryland through direct appropriations and the services of the state drainage engineer, and technical assistance by the Soil Conservation Service through the Wicomico and Worcester Soil Conservation Districts. Labor for clearing was furnished by a CCC and later a CPS camp. The county agents in the two counties led the educational program. Teamwork thus accomplished a conservation job that has added millions in farm income. Over 80,000 acres of the watershed is in Maryland, with an additional 15,000 in Delaware—41,000 acres in cultivation.

Most of the conservation work is not so spectacular as group drainage. But the same sort of cooperative effort has been at work on individual farms. About 40 percent of Maryland's farm operators are district cooperators; they operate 50 percent of the State's farmland. Basic conservation plans have been developed for over two-thirds of them. Conservation accomplishments on the land have been and are continuing at a high rate. We shall attempt in the following paragraphs to explain how teamwork has helped.

Most of the districts have conducted an aggressive educational and informational program. This has served to impress landowners with the need for action and to explain how the district could help on conservation problems. Supervisors have received assistance with this phase of their program from many sources: press, radio, and television; farm organizations, particularly the granges and farm bureaus; Friends of the Land; the Extension Service through its county agents, extension soil conservationists, and other specialists; the vocational agriculture departments; fish and game clubs; banks and bankers' associations; state and federal conservation agencies, among them the Maryland Game and Inland Fish

"Before" and "after" views of a group drainage job in Worcester County, Md.

Commission, and the Maryland Department of Forests and Parks; the Agricultural Conservation Program Service, and the Soil Conservation Service. There are other forces, also, which aid in this work. The extension soil conservationist has assisted the curriculum committee of the State Board of Education with teaching aids and in distribution of teaching materials. The Committee for Conservation Now, a private organization, has done much to publicize the need for conservation. Private industry, fertilizer manufacturers, railroads, and others have been active.

The need for development of a basic conservation plan, rather than unrelated practices, has been emphasized throughout. Results from conservation farming in terms of yields and increased efficiency are also publicized, as well as benefits to the general public.

The State Soil Conservation Committee has been a positive force here, under the leadership of Dr. T. B. Symons, Dr. William B. Kemp, and the present chairman, Dr. Gordon M. Cairns. The committee's current State appropriations are $80,000 a year, most of which goes to district supervisors for expenses.

This is typical of the farm drainage problem on Maryland's Eastern Shore.

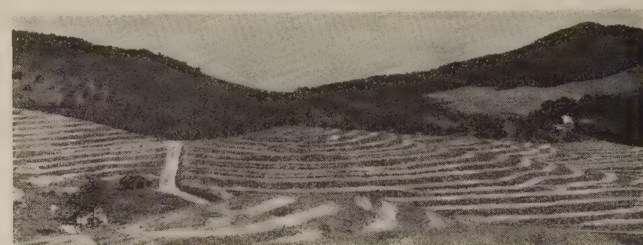
The State Association of Soil Conservation Districts, under the past leadership of Walter Burall, William Powel, and presently under Harry Reick has well served the interests of districts. On recommendation of the State Association, the State Soil Conservation Committee, and the Maryland Farm Bureau, a joint resolution was passed by the legislature for the study of water problems. Reick is chairman of this study group, which represents several segments of the state's economy and is indicative of the interest in arriving at an answer to the pressing water problems of the state.

To assure sound technical recommendations for proper land use and supporting conservation treatment, technical guides are drawn up by Soil Conservation Service technicians for their use in assisting district cooperators in developing conservation farm plans. These guides are prepared with the help of representatives of the Maryland Agricultural Experiment Station, extension specialists and county agents, the Department of Forests and Parks, and the Game and Inland Fish Commission.

Part of the conservation job at Baltimore's new airport was the establishment of ornamental shrubs on banks along the ramp leading to the upper level, in cooperation with the Anne Arundel County Soil Conservation District.

Fact Sheets issued by the Extension Service, particularly those of the agronomy department, have stressed the need for soil and water conservation in their recommendations. Other departments of the College of Agriculture have had a direct hand in the solution of conservation problems. An example is a guide for sprinkler irrigation recently developed cooperatively by several departments of the college, the Agricultural Research Service, and the Soil Conservation Service.

A number of research problems have been tackled and solutions reached through cooperation of the last three agencies.



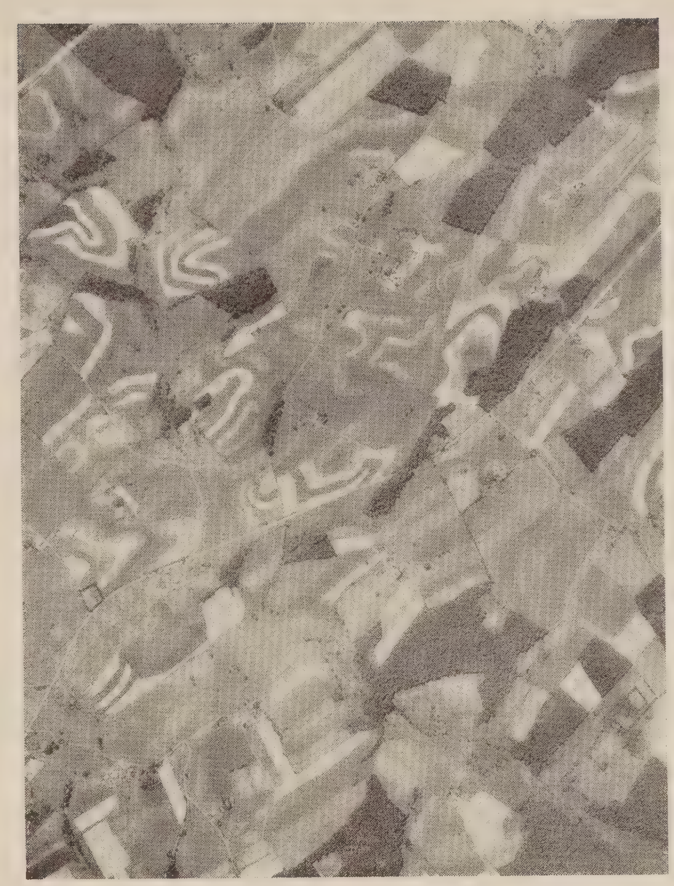
Most new orchards in the state are planted on the contour.

The Department of Forests and Parks and the Game and Inland Fish Commission assist district cooperators by furnishing trees, shrubs, and seeds, and in planting. The Department of Forests and Parks also assists in marking woodlands for harvest and other cuttings. The Game and Inland Fish Commission furnishes fish for stocking ponds and helps with other features of the plan relating to wildlife conservation.

Most of the conservation work requiring heavy equipment is done by private contractors. Most districts have small equipment which is available for use of cooperators at reasonable rental rates. The Mardelva Farm Equipment Dealers Association has been a strong supporter of soil conservation districts. Credit agencies, both private and public, have encouraged farmers to adopt soil and water conservation programs. The Farmer's Home Administration has encouraged borrowers to cooperate with their districts.

Public Law 566, 83d Congress—the Watershed Protection and Flood Control Act—offers still more opportunities for cooperative endeavor. This act provides a basis for Federal participation and assistance in carrying out

Area in Carrol County, Md., before conservation—1937.



After conservation practices were put in effect—1952.

works of improvement for flood prevention and agricultural phases of the conservation, development, utilization, and disposal of water in a watershed. Rural and urban folks have a chance to work together in dealing with problems which affect both—a real challenge to all.

Here, too, soil conservation district supervisors are exerting a vigorous leadership. Several applications for planning assistance have already been received by the State Soil Conservation Committee, the state agency which receives such applications and sets up priorities, and surveys are under way on three watersheds in the State.

The watershed approach used previously on watersheds for planning and applying conservation measures is being followed extensively under the new legislation. Watershed groups have varied in size from a few farms up to several hundred. In order for a drainage enterprise to succeed there must be group action in the watershed. Experience shows that similar group action is essential for solving erosion and other water problems.

The Interstate Commission on the Potomac River Basin has fostered the formation of watershed councils or associations. A good start has been made on the tremendous task of trying to clean up the Potomac River.

The districts have enjoyed close cooperation from municipal water companies. The protection of a municipal water supply, for example, is being carried out by the Washington Suburban Sanitary Commission and the Howard and Montgomery County Soil Conservation Districts. The commission furnishes water to suburban Washington. In the watershed area above the reservoirs an intensive program of treatment is being followed on sediment sources along highways and streambanks as well as on farmlands. The commission has contributed financially to the districts in this work as well as taken corrective measures on its own lands.

In making payments for conservation practices under the Agricultural Conservation Program, emphasis has been on fitting in permanent-type practices in the basic conservation plan for each farm.

A splendid program of highway erosion control is being carried out by the State Roads Commission. Water disposal systems are designed to protect farmlands as well as highways.

The Maryland Department of Mines, Geology, and Water Resources has the responsibility of approving farm pond and other water developments. Good working relationships exist between this department, the districts, and the technical agencies.

An annual event which sharply points up conservation work in the State is Maryland Land Week. This program, held in the fall, calls to the attention of all citizens of the State the need for conservation and improvement of soil, water, forest, and wildlife resources. While this is statewide in character, special emphasis is given each year to one geographic area comprising several counties. Exhibits, tours, newspaper articles, and events of interest reach thousands of people annually.

Many individuals and many agencies and groups have shared in the success of the program of soil and water conservation in the State. We have room here to name only a few. The soil conservation district supplies the focal point. If we will but multiply our efforts—nationwide—with all agencies pitching in as they have in Maryland we can be certain that conservation over a great part of the nation will become an accomplished fact.

A Study of Rain Storms

By LLOYD L. HARROLD

No. 9

This is the ninth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

IN A RECENT national report on research needs, the Soil Conservation Service gave water problems a top priority, saying—

"As a result of the Nation's growing recognition of water problems and their importance, great new responsibilities have been added to the many in this field previously assigned to the Service. Accordingly, we place heaviest emphasis on the research needs associated with the program to control, manage, conserve, and beneficially use water. The Service is making use of all available scientific knowledge about this great resource. Great strides are being made toward our assigned objectives—protection of small watersheds, flood prevention, and better management and use of water on farms and ranches. However, progress could be speeded and costs of protective measures could be reduced if science brought about a better understanding of the principles of water behavior on watersheds and in the various soils. Also, in view of the fact that movement of water through a soil is one of the chief determinants of proper use and treatment of that soil, technicians in the field of soil and water conservation need to know as much as possible about the basic principles of behavior of water in soils."

There are only a few places in the United States where water behavior and land facts are being gathered. The Coshocton, Ohio, Station is one of them. It is operated by Agricultural Research Service, U. S. Department of Agriculture, in cooperation with the Ohio Agricultural Experiment Station at Wooster.

The results of studies at this station point to fundamental relationships of climate, soils, and crops that dictate the behavior of water on land. The data in this article are used to illustrate the fundamentals and are not intended to reflect firm quantitative evaluations. The period of record is too short and the area studied too small for that. The relationships are not new. Some may seem elementary. Yet

Note.—The author is project supervisor, Soil and Water Conservation Research Station, Agricultural Research Service, U.S. Department of Agriculture, Coshocton, Ohio.

Laboratory analysis of field samples.

they are important because they tend to keep attention focused on the major factors of the soil- and water-management problem. Thus even with very little on-the-spot research data, one is less likely to underestimate or overestimate greatly the value of his conservation program, or to overlook the many opportunities of working with nature's ever changing processes.

First in the line of our search for fundamental knowledge of water behavior on the land, is a study of precipitation—nature's supply to the earth's surface. Wherever one finds the water problem, one can develop his own series of facts such as we have prepared for Coshocton and set forth here.

In the humid section of the country precipitation exerts perhaps the greatest influence in the soil and water conservation program. The annual amount of precipitation varies over the 22 states from about 20 inches in northern Minnesota to over 40 inches in Virginia. The normal distribution over the 12 months, however, appears to have a noticeable similarity throughout, greater monthly amounts falling in the growing season than in the dormant season. We recognize that this is desirable as in the growing season crops need more water and then, also, the soil reservoir ordinarily has plenty of space to store this storm rainfall.

Our further study of the relationship of precipitation to conservation involves the development of an understanding of the different characteristics of the dormant- and growing-season storm precipitation, as follows:

Table 1.—Precipitation characteristics

Characteristics	Dormant season	Growing season
Form	Solid and liquid	Liquid
Intensity	Low	High
Drop size	Small	Large
Duration of storm	Long	Short
Area of storm	Large	Small

Note.—Dormant season in this area is October-April and growing season, May-September.

These characteristics resulted in 85 percent of the annual water-born soil loss occurring in the May-September period. Observations were made on land fallow for 12 months. The energy of large raindrops falling on bare soil stirs up the soil. High intensity of rainfall causes much surface runoff which transports the soil loosened by raindrops.

In areas where freezing occurs, there is likely to be a period of high erosion when water runs off land slopes having a thin layer of thawed soil over a depth of frozen soil. Whatever the conditions, conservation technicians are en-

Harrold explains automatic weighing and recording operation of the giant lysimeter at Coshocton which measures moisture changes in the soil. Listening is Harold E. Pinches, assistant director of farm and land management research, Agricultural Research Service.

School essay contestants hear Lloyd Harrold talk on the proper management of soil and water.

couraged to develop for their own work area a chart of fundamental relationships like that given above. A clearer realization of the problem, field by field, and more substantial farm plans, will result as technician and farmer start with the fundamentals firmly established.

While on the subject of precipitation, it is well to consider its relationship to floods. The Ohio River Basin is commonly cited and the question is asked: "When do floods occur?" The answer invariably is "Winter and spring." Then we look at the breakdown of precipitation characteristics for the dormant season and ask: "Why?" The answer lies in items 1, 4, and 5. Snowmelt, along with rainfall, is a big factor at times. More often, however, the duration and areal extent of the storm are the major causative factors. A storm of several days soaks the soil, leaving little or no room for additional water absorption. Continued rainfall, therefore, must run off. Rainfall intensity is usually low (compared with summer rates), and the resultant runoff from watershed fields is at low rates. Flow from watersheds of a few acres or square miles is not excessive—usually well within the streambanks. Since the winter or spring storms cover most of the area of the big watershed, there are thousands of small streams contributing their flow at the same time to the big river channel. The channel isn't big enough to carry this water. Overbank flooding results.

Winter and spring storms saturate the soil, exhaust the soil storage space, and continued rainfall over large areas causes large river basin floods. This means that downstream flood-control works may be necessary to handle these excessive waterflows.

Attention is now directed to the growing-season floods—those that result from very high rainfall rates. Since the areal extent of these storms usually is small, the resultant flood area is small. See Table 2.

Table 2.—Seasonal occurrence of floods in the Ohio River Basin according to watershed size.

Drainage area in square miles	Percentage of time of maximum annual floods occurring in—	
	May-September	October-April
1	99	1
10	87	13
100	66	34
1,000	26	74
10,000	10	90
100,000	5	95

Surely, this distribution varies from region to region. Yet, the conservationist will be better qualified to discuss and develop flood-control programs when he realizes the basic causes of floods. Summer small-area floods in some areas are severe. In the Ohio region, the soil in this season usually is dry enough to provide a good-sized reservoir for water storage. Why not make better use of it? Let's look at the story of Johnson Run near Shenandoah, Iowa:

Area = 1,230 acres
Soil = Marshall silt loam, deep, well drained.
What happened:

1. Floods in Shenandoah were frequent and severe.
2. Now every farm in Johnson Run operates under a conservation plan with contour cultivation and 26 miles of level terraces.

3. In June 1947 when nearby streams reached all-time high levels, Johnson Run was 2/3 full.
4. In May 1951 with 2.41 inches of rain in 2½ hours, Johnson Run was ½ full.
5. In May 1950 with 5.11 inches of rain in 24 hours, Johnson Run was well within its banks.

We can also examine the records of a 43.6-acre watershed at the Coshocton Research Station. Before 1939, one-third of this area was in native hardwoods, and the remainder in gullied and abandoned cropland. In 1939 this poor land was reforested to pines which by 1945 had become fairly well established. The flood record on this watershed indicates that the 10- and 25-year flood peaks may be expected to be reduced about 20 percent and the 5-year peak about 30 percent as a result of this reforestation. These are growing-season floods. The results cannot be multiplied by a thousand to evaluate the effect of similar land use changes on a 43,600-acre area. There are many other factors which make this conversion from small area to large area impractical. We need to learn how to project information obtained on small experimental watersheds up to watersheds of several hundred square miles in size.

The technician, however, can learn much about his technical job and water behavior on the land by a study of the Coshocton small-watershed results. These watersheds are only 2 to 3 acres in size and are in a single crop in a particular season. A 4-year rotation of corn, wheat, and 2 years of meadow is followed. Conservation farming practices are compared with the conventional. The May-September 1948 results on 15 percent sloping land, as an example, are given below—

Conventional:

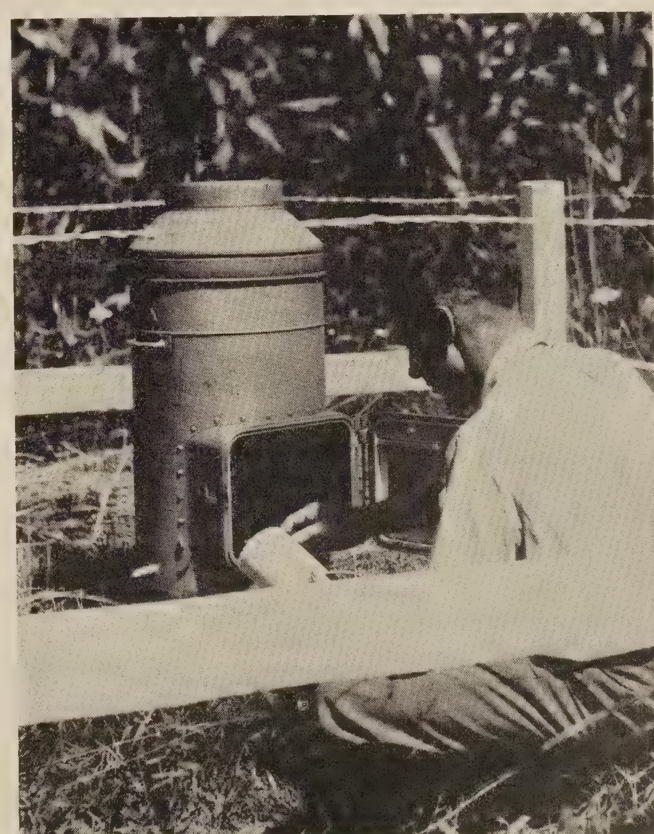
total runoff = 2.86 inches
peak rate = 3.90 inches per hour
soil loss = 23.0 tons per acre

Conservation:

total runoff = 1.14 inches
peak rate = 1.77 inches per hour
soil loss = 7.8 tons per acre

Such results are gratifying. Reduction in waste of water and soil of this magnitude should be accomplished on many more acres of our nation's farmland. Yet, in research, we have been looking for ways to accomplish even greater reductions on each acre of land. This end becomes more purposeful when we realize the high value of soil washed off the land. Research by R. B. Hickok and Helmut Kohnke on the West Lafayette, Ind., watersheds showed that the concentration of nitrates in soil washed off the land of 3 percent slope was 3 times that in soil remaining on the farm field. The ratio for potash was 17.

The effect of contouring was to slow down the velocity of runoff water, thus increasing the time of infiltration opportunity, reducing its cutting force, and reducing the ability of flowing water to carry soil torn loose by raindrops. The effect of mulches has been even more striking. Mulching begins its conservation job where the erosion process starts—at the surface. With other conservation research workers, we found that mulch on the surface of watersheds in corn reduced the damaging



Measuring precipitation—amounts, rates, distribution.

effect of raindrops and almost eliminated erosion and waste of water through runoff. Results for the May-September 1948 period are given below—

Mulch culture on contour:
total runoff = 0.05 inch
peak rate = 0.17 inch per hour
soil loss = 0.027 ton per acre

Just as we have seen a great change from straight-row farming to contour cultivation and stripcropping, we are likely to see equally great changes from clean tillage to mulch tillage and from finely-worked seedbeds to a minimum of seedbed preparation. Both of the latter changes are likely to have a significant effect on water behavior on the land. The Soil and Water Conservation Research Branch of Agricultural Research Service is attempting to determine how these changes can best be achieved under a variety of conditions.

So far, we have discussed basic principles of land surface treatment and their influence on water behavior. Next, we take up the soil profile, and its influence on the behavior of water on the land. Suppose we look at the storm of July 28, 1950. Rain of 1.1 inches fell on cornland of our conservation watershed in this one storm. Previous measurements had indicated that the unused moisture storage in the top 7 inches of the Keene silt loam amounted to 2.8 inches of water. Although this storage space was over twice as great as the amount of the rain, 0.5 inch of runoff occurred. Erosion totaled 2 tons per acre. No waste of water or loss of soil should have occurred. In fact, it did not occur on the mulched corn watershed. Available storage space was used.

There are, however, times when the readily available soil storage space is not sufficient to absorb all the rainfall, as illustrated by the storm of September 1, 1950. Rain totaled 4.3 inches. The 2.8 inches of storage space in the top 7 inches of soil was considered as readily available. Water penetrated to the 7-inch depth rapidly where the soil surface was protected from sealing. When fairly dry, the absorptive capacity of the topsoil is 6 inches per hour. At the same moisture content, the absorptive capacity of the subsoil is only 0.25 inch per hour. Therefore, you see why only that storage space in the topsoil is considered to be readily available.

With 2.8 inches of storage in 7 inches of topsoil, runoff from the 4.3-inch storm would be expected to be about 1.5 inches. For an eroded soil of 3-inch depth, storage space might be only 1.2 inches, and resultant runoff 3.1 inches. This is another good reason to stop erosion—to retain a good volume of storage space to absorb storm rainfall. Now let's raise our sights and shoot for attaining a greater effective depth of topsoil for quick water storage. Why not have 10, 12, or 14 inches of soil depth for rapid storage?

At the same moisture content indicated above—2.8 inches of water storage for a 7-inch soil depth—there might be 4.0, 4.8, or 5.6 inches of water-storage space for the three greater soil depths. It is estimated that if the effective depth of topsoil could be increased to provide a readily available soil reservoir space for 5 inches of storm rainfall, there would be almost no runoff periods in the growing season.

All this illustrates some of the important basic principles of water behavior on the land. Certainly, one must expect the quantitative relationships to differ from region to region and even from field to field. Yet, with these fundamentals firmly established in his thinking, a technician is equipped to recognize the problem on each field and to prescribe remedial measures. Furthermore, he is better able to estimate the magnitude of rainstorm effects in watershed programs. Accelerated research is a vital need.

SUMMER READING.—The Smokey Bear Vacation Reading Club for Orangeburg County got off to a bang with over 400 children registered in the City of Orangeburg alone.

The reading club was jointly sponsored by the South Carolina State Commission of Forestry, the State Library Board, and the Orangeburg Soil Conservation District supervisors.

The club got under way in June and ran through August. Each child enrolled reads 5 to 10 books on soil and water conservation. The literature was made available by the Orangeburg Free Library bookmobiles and by the library in Orangeburg.

The reading program was a natural way of using the soil and water conservation literature given by the district 4 years ago. Mrs. Georgie Adams says, "The children take to it like ducks take to water." The Orangeburg Soil Conservation District ordered $50 worth of additional literature as a prize and gift to the library when over 50 percent of the children read 10 books from the soil and water conservation file.

District Operates Own Nursery

Philip W. Spalding, at left, helps George Magnuson dig up red pine trees at the Dukes County Soil Conservation District nursery on Martha's Vineyard. Magnuson was to use the trees for replanting and reinforcing a windbreak on his island farm.

By EZRA I. SHAW

THE Dukes Soil Conservation District has set up its own nursery on Martha's Vineyard, Mass., to supply cooperating farmers with trees needed to reforest the land and supply windbreaks to take the punch out of soil-damaging gales.

In 7 years previously district farmers had planted nearly a third of a million trees, using stock from the Big Flats nursery when it was operated by the Soil Conservation Service. How to keep up this good work with such stock no longer available became a problem.

Trees could be bought from the State nursery but the cost was increasing, said the district's annual report.

"The district has never charged cooperators for trees and the supervisors believe that such

Note.—The author is work unit conservationist, Soil Conservation Service, Vineyard Haven, Mass.

policy promotes the planting of more trees," said John G. MacKenty, treasurer.

Faced with the problem of finding a new source of low-cost trees, the district acted quickly. District Secretary Philip W. Spalding offered a part of his farm at West Tisbury for a nursery. Seedlings on hand and later received under an earlier order from Big Flats were put in the nursery. But last spring the district began planting its own trees, starting with Japanese black, red, and Austrian pine, and white and Norway spruce. Birds got away with some of the seed. But this temporary setback made the supervisors more determined than ever to make a go of the nursery.

"In 3 or 4 years the trees growing from seed should be ready for distribution to cooperators," MacKenty said.

The district is off to a modest start with its new project. But the supervisors believe that the nursery will become large enough to supply relatively low-cost trees to all cooperating farmers who have woodlands and windbreaks to take care of as part of their overall soil conservation programs.

REVIEWS

SHOPWORK ON THE FARM. By Mack M. Jones. 616 pp. Illustrated. 1955. New York: McGraw-Hill.

THIS is an excellent and up-to-date revision of the very practical book with the same title and author which was printed in 1945. The new methods, machines, and gadgets developed for farm shopwork in the last 10 years are discussed in this edition. It is a readable and instructive book for those interested in almost any phase of farm shopwork except the repair of tractors, trucks, and automobiles. It should be an excellent reference or handbook for farmers, Vo-Ag teachers and students, and others interested in farm shopwork.

Chapter 1 gives practical information on how to plan and equip a farm shop. The succeeding chapters discuss methods and procedures for carpentry, cabinet work, metal work, soldering and welding, concrete work, rope and leather work, care and maintenance of farm tools and equipment, and include excellent pointers about selection and use of the many types of power tools and gadgets available.

The main emphasis throughout the book is placed on the use of correct methods and tools and why those methods or tools are best. If you want information on how to cut a rafter, sharpen a saw (any kind), mix and cure watertight concrete, build and maintain a forge, splice a rope or an electric wire, do electric-arc or oxyacetylene welding, repair leaky valves or faucets, install a simple shower bath, install a doorbell or buzzer, sketch or draw building plans, use a cold chisel, or do most other jobs commonly done by a farmer or home owner, this book is an excellent reference and guide. Safety precautions, especially in the use of power tools, are also stressed.

It is one of the McGraw-Hill Rural Activities Series, and is one of the best of that series. The author, Mack M. Jones, of the University of Missouri, has had 35 years of experience in teaching farm shopwork and has written many other practical books on this subject. He is an excellent amateur photographer and his daughter, Virginia, is an excellent pen and ink sketcher. Between them they have filled the book with hundreds of excellent photographs and drawings. In addition, Professor Jones has borrowed dozens of excellent photographs from the many manufacturers and distributors of equipment useful in a farm shop.

—TOM DALE

December 1955

SOIL CONSERVATION

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SOIL CONSERVATION

DECEMBER 1955

VOL. XXI—NO. 5

EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

WELLINGTON BRINK
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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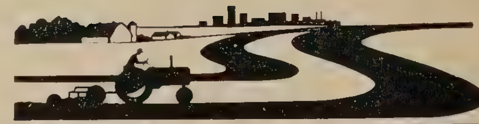


OUR SOIL ★ OUR STRENGTH

TIME-TESTED VALUE. — Eighty-six 1-year subscriptions to SOIL CONSERVATION Magazine have been purchased for new cooperators by the Kingsbury County Soil Conservation District, De Smet, S. Dak. This brings the total number of subscriptions by this district to 741, which very likely tops all districts in the country.

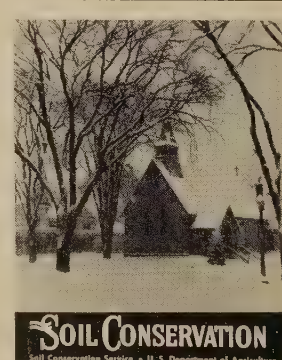
Harold C. Fritzel, treasurer, writes: "Our board has made it a practice each year to send SOIL CONSERVATION Magazine to each new individual farmer when he signs up. Also, we include the banks, schools, and libraries in Kingsbury County. Seems to be a habit, and we are in no notion of breaking it."

SCHOOLS BENEFIT. — One-year subscriptions to this magazine have been supplied the 13 high schools of Atlantic and Cape May counties, in southern New Jersey, by courtesy of the supervisors of the Southeast Jersey Soil Conservation District.

Says Charles A. Dupras, secretary: "While agriculture is not the main industry in the district, it was felt that

(Continued on page 102)

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Winter comes to a New Hampshire village.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Green Spot on the Idaho Map

Here is a ranch built by hard work and the pioneering instinct. Clay Sutton and family shifted from grain to livestock, brought in crested and intermediate wheatgrass, worked closely with their soil conservation district.

By HUGH F. EAMES

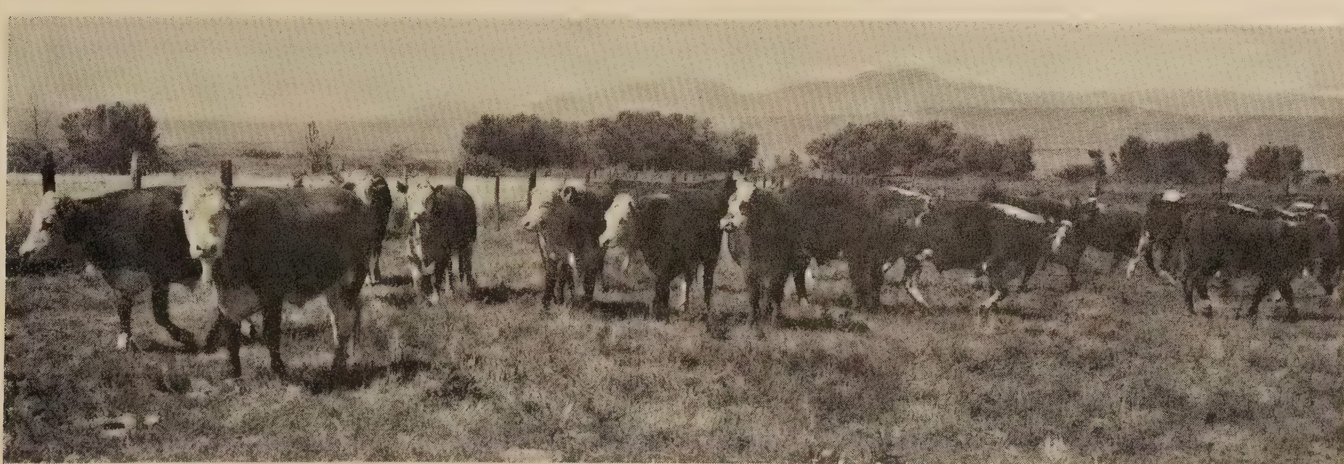
IN early June you drive through Midvale, Idaho, a Weiser River town, turn into Fairview School Road and after a few more miles come upon a series of well rounded hills. Spread over the tops and down the steep to gentle slopes, there is a thick and even covering of fresh green grass and alfalfa that looks to be at least knee deep. A lot of it may be 2 feet high. It is almost a solid mass wherever you look. Sturdy Hereford cattle, resting contentedly or grazing, break into the picture on some of the slopes and hilltops. In another field is a small herd of purebred Holsteins.

This pleasant scene continues for at least 2 miles. In the distant background are mountains against the blue sky. There are occasional patches of small woodsy growths and sometimes areas in trees. You round a turn and note a interrupting the sweep of rangeland are large modest little farmstead, attractively set amidst lawns and gardens with trees, shrubs, vines, and a riot of colorful blooms. A man and a woman are working there. If you drive into the yard, a smiling greeting awaits you. Eyes sparkle, handshakes are hearty. You are not a stranger very long.

Mr. and Mrs. W. Clay Sutton live here, and what grips one's admiration along the way is their farm, known as Eastside Ranch and embracing more than 3,000 acres. Closely tied up with it are 780 more acres that belong to their sons, Buhl and Wayne. Altogether the Suttons possess something like 3,900 debt-free acres, 2½ miles long and 1½ miles deep, handled as a single operation. Some 1,200 acres are being farmed, and less than 600 in the 3,000 total have been relegated, Clay says, to what he calls his "marginal" cropland. This acreage is being put into pasture grass seedings under a schedule that brings improvement every year.

They show it to you, take you right out into the hay fields and easy-to-reach pastures, close to the cattle, and tell you what it all means to them. It has put 5 children through 4 years of college. The sixth attended 2 years before he surrendered to an overwhelming urge to get back to the ranch. All of them went to the University of Idaho, like their dad, who worked his way through.

All of it makes a tremendous accomplishment since the Suttons started there on 280 acres in 1919. That was 10 years after Clay, his father and sister individually began homesteading in



Some of Sutton's choice beef animals, held in barn lot while river bottom pasture is being irrigated.

the Midvale area, and 53 years after Clay's parents and their 7 children, when Clay was 13, came from Missouri's Ozarks to homestead with only $8 in cash among them. The elder Sutton and his family cut and piled firewood for a Genesee, Idaho, hotelman in exchange for room and board. Then he got a $2-a-day laborer's job until he could rent a farm nearby. He didn't have enough money to buy land, even when it could be had for as little as $30 per acre—he just wouldn't go into debt.

"There's been quite a change since then for all of us," says Clay. Today, life is comparatively relaxed after the long years of toil and sacrifices.

It was difficult making a start in the Midvale area. All of the 280 acres which Clay Sutton undertook to buy after giving up homesteading was in cropland. But only 18 acres were in cultivation, the rest being in sagebrush which had to be cleared. For a long time there wasn't enough grass to carry 10 head of livestock. Years of hard work and an assist from the boom period enabled young Sutton to extend the use of his land and to buy additional acres, but he was saddled with debt. When the depression hit, he lost all of his land, with the exception of his original 280 acres and also all but 13 head of his livestock. He found it necessary to take an off-farm job to make a living.

As Clay remembers those years, "I really tried to lose all the property that I had because it was too much of a burden." He did not succeed in that. And the bank that took most of his land went broke. When the wreckage at last had been cleared away, Clay managed somehow to regain all of his former holdings and make a fresh start.

In those trying years and others that followed Clay learned something about land use and capabilities that he has never forgotten, because he put it to work on his farm and made it pay dividends. It was suggested to him one day when he tried to make a loan so he could pay his debts. The tip was in the answer that he got: "No loan to pay your debts, but a big enough loan if you want to use it to start a livestock operation."

Clay went back home and began to buy calves. They were cheap, and as his means permitted he made a beginning as a livestock farmer. Later he took a big step forward by buying two carloads of Herefords, 60 animals around which to build his purebred herd. Now he annually runs 300 head and buys and finishes-off 100 steers. When he sends his beef animals to market, all are sold as "choice"—top grade.

Farming continued to be difficult because of lack of balance in livestock, dairying, and small grain operations. Farming too much low-producing land cut into profits from the most productive acres. Average grain yield took a licking when his best land produced 25 to 30 bushels per acre as against 5 to 10 bushels from the poorer land. By eliminating the marginal acreage and seeding it to tame pasture grasses he achieved a better balance and got the additional pasture that he needed to carry his livestock.

An unexepcted break came during this crisis, when Civilian Conservation Corps (CCC) technicians came around with ideas for making better use of his land than growing grain and sinking into debt. They offered to help him seed 35 acres to a new type of grass fitted to his dry lands, to build fences to give control over grazing, to plant trees and shrubs that would provide shade for cattle, and to protect eroding streambanks and develop well located stock-watering places. All he was asked to do was to provide needed materials.

Sutton stretched his resources and met the requirements. Soil Conservation Service technicians working with the CCC taught him how to do the seeding. Camp labor built fences, planted trees and shrubs, built watering troughs, and developed springs. Clay used the recommended crested wheatgrass for the first planting to be made in that area. It fitted into the capabilities of his soil when seeded with alfalfa, big blue bunch, and bromegrass, and turned out the forage that Clay's livestock lacked.

Subsequently, intermediate wheatgrass also became a strong producer on the Sutton holdings. Its plantings doubled and redoubled as the years moved along. After 15 years of annual use, the original 35-acre planting of crested wheatgrass is still a good producing unit. It is not so thick as formerly, but Clay still points to it with pride. His total planting of crested and intermediate wheatgrass now runs to 370 acres and carries his cattle on these acres up to 8 months every year. Seventy acres, seeded

Mr. and Mrs. Clay Sutton and their sons, Buhl and Wayne.

last spring, looked promising after late June and early July rains.

When CCC ceased operations because its job had been finished, along came another organization that has been of tremendous service to Clay and about 500 other cooperators—the Weiser River Soil Conservation District.[1] Clay was in the group of 7 or 8 farmers who helped get the district going. He became its first secretary-treasurer and served in that capacity until early in the 1950's. What's more, he applied a soil and water conservation program to every acre that he acquired in building his 3,000-acre plant.

Except for 2 large tracts in pasture and 2 under irrigation, all of Clay's land and that of his sons is consolidated in one operation. The irrigated exceptions are 45 acres in the nearby Weiser River bottom lands, and 100 acres in Long Valley, Valley County. From his Weiser River bottom land he gets "a barn full of hay" from one cutting; he has harvested as much as 3 tons per acre there before turning in livestock to graze until freezing weather. In Long Valley he runs 90 head of livestock. The soil there will produce alsike-cloverseed and small grains, but its most profitable present use is pasture. Animals feed there until snow falls.

When you walk over the home farm with Clay he guides you to a 40-acre field that had puzzled you when you observed it from the highway. It didn't appear to have such lush growth as the other fields. In fact, it had a wornout appearance. But when you step into it and take a close look, you find that it isn't wornout at all. There is plenty of alfalfa, intermediate wheatgrass, and bulbous blue for the small herd that it feeding. "The field looks bad, but it really isn't," Clay points out. It got the "bad" look, he explains, because spring conditions made it necessary to run 21 grown animals and calves and yearlings there from early April until early June, when new pastures could be used. He left about a dozen head there and in mid-June they were not suffering for lack of good forage. "It was a good test for intermediate wheatgrass; proved that it has what it takes when it is necessary to carry a heavier than usual growth, then make a strong recovery," Clay commented.

Last year Sutton had 500 acres in alfalfa hay. He's down to 400 this year, having put new seedings in the other 100. When he seeds for hay, he puts grass in the mixture, using crested, pubescent, or intermediate wheatgrass, and bulbous blue. Clay says that bulbous blue is a strong factor because it is tops for early grazing and tops again in the late fall. Grass in all hay mixtures, he says, helps keep the growth clean.

In using 3,900 acres, Clay and his sons keep 1,000 and 1,200 acres in crops. About 540 are in grass and the remaining 2,100 in range. Wheat and barley are grown on 350 to 400 acres as feed for livestock. On dry land, wheat averages about 25 bushels per acre as contrasted to the 7 that he usually got in the early years. He grows no corn or oats, puts up no silage. He buys concentrates and sells surplus hay; last year he shipped to Missouri 91 carloads of alfalfa—60 from his own farm and 31 from his neighbors.

On irrigated pastures the Suttons seed alta fescue, smooth brome, orchardgrass, and ladino clover. On dry land the mixture contains alfalfa, sweetclover, bulbous blue, crested intermediate, or pubescent (Topar) wheatgrass.

Clay harvests seed from his alfalfa after

[1] See the article, "Grass Carpets Way to New Wealth," in the October 1955 SOIL CONSERVATION Magazine.

Here's how Sutton hay is housed in the ranch stack-yard.

cutting the first growth for hay. From his dry land he usually harvests as much as 2 tons per acre in the first cutting. Occasionally it goes as high as 3 tons. Seed production averages 100 to 200 pounds per acre, between 250 and 300 acres annually being put to this use. In 1953 he harvested 50,000 pounds. Last year he garnered more than 30,000 pounds which he is still holding. When he plowed with horses he let the alfalfa for hay and seed stand 10 to 12 years. Now, with tractor available, he finds it more profitable to turn alfalfa under after 5 or 6 years, and with this soil buildup he takes off 2 or 3 good crops of wheat. His son Buhl specializes in pubescent wheatgrass, to which he devotes 40 acres each year to seed production and pasturage. Some of this land has been yielding seed for 5 years.

In addition to his 10 years on the district's governing body, Clay has served 2 years as chairman of the Idaho State Association of Soil Conservation Districts, 19 years as a director of the Farmers Cooperative Creamery at Payette, and 14 years as a fieldman and appraiser for the Federal Land Bank of Spokane. He was elected to the Idaho State Legislature in 1954 for a 2-year term.

Mrs. Sutton, daughter of a minister, is a full-time partner in the Sutton enterprise. She has more than 400 varieties of iris in the flower gardens. She is a collector of vinegar cruets of which she has more than 300.

What the Suttons have put together at Eastside Ranch and its offshoots represents 35 years of earnest effort, the investment of considerable money, and close cooperation with the soil conservation district. But all of the expenditures for land and its development, for new barns and other farm buildings, for a new homstead, for equipment, and all the rest that goes into modern farming have come back two or three times as income has built up. The keys to his success, says Clay Sutton, were the decision to shift from grain to livestock and grass, the assistance received from the CCC and the district, and the guidance of SCS technicians.

But Clay reminds us: "We're not the only people who have had such benefits, and we're not the only people who are producing good grass and have good livestock operations. Right in this area 25 to 30 other farmers are benefiting from production of crested and intermediate wheatgrass, and in other parts of the soil conservation district there are many more. We haven't any monoply on good grass. If you want to see more, visit such farmers as Dewey Alexander, Lewis Brothers, Forest and Donald Sifton, Donald Beigh, Darrow Keithly, Roy Clelland, Robert Wiley, Leo Courtright, Milton Branch, Adolph Geartner, Jr., Andy Anderson, and Bob Finke. All of these ranchers, and many more, have good grass seedings. The Weiser River Soil Conservation District contains a lot of farmers who are making the best use of their land and protecting and improving it for use of generations yet to come."

SCHOOLS BENEFIT

(Continued from papge 98)

soil and moisture conservation was the concern of everyone. This is one way in which the broad program of soil and moisture conservation could be brought to the attention of a large number of students."

What Do We Mean by Creeping Alfalfas?

No. 10

This is the tenth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By **HUGO O. GRAUMANN**

PLANT breeders working with pasture type alafalfas have noted and reported much plant-to-plant variability in the nature and extent of the spreading habit. Occasional plants in breeding nurseries have shown unusual capacity for spread and yield. Mere observation of well developed plants of this type might easily lead the layman to envision a variety that is comprised entirely of lush growing, prolific creeping plants that unfailingly give the miraculous in performance. To help avoid such misconceptions, it seems appropriate to review what is really meant by creeping alfalfas and to point out briefly some of their limitations.

Alfalfas being investigated for pasture purposes may be placed in three distinct categories with regard to crown development and spreading ability. These are (1) wide, low-crowned types in which the underground portions of the stems show no tendency to develop roots, (2) wide, low-crowned types which have the inherent ability to produce rooting underground stems, and (3) those with low crowns which spread by means of creeping roots.

All alfalfas produce new buds at or near the crown. These buds give rise to the shoots which constitute the top growth. A prerequisite of superior alfalfas for pasturage is that they have low crowns with bud development largely underground so that trampling and grazing injury by livestock will be minimized. Such types currently available to the breeder produce most of their crown buds in the upper 3 or 4 inches of the soil. Crown width of these as determined by diameter of the plant at ground level may vary from 8 to 20 inches for those whose underground stems normally are nonrooting. The proper designation for such types is simply wide, low-crowned nonspreading alfalfas. Alfalfas which most nearly fit into this category are varieties such as Ladak and experimental strains such as A–224.

The wide, low-crowned types which develop roots, such as the varieties Nomad and Rhizoma, have been referred to as rhizomatous alfalfas. However, not all the plants in random populations from these varieties and similar experimental strains possess the spreading habit. Old established plantings of the rhizomatous varieties growing under the most ideal conditions for spreading will show both nonspreading and spreading plants. The spreading plants usually show little or no evidence of this characteristic

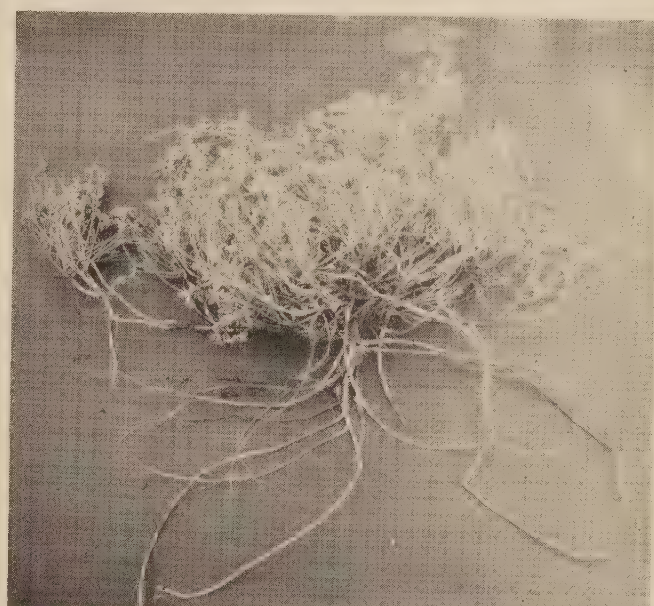


Figure 1.—A 2-year-old alfalfa plant from a rhizomatous experimental strain showing early stages of root development on one of the rooting underground stems.

Note.—The author is research agronomist, field crops research branch, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Md.

during the first 2 or 3 years following planting. The crown width of these when finally fully-developed may range from approximately 1½ feet upward (Figure 1). When grown in thin stands under hoof for years in relatively dry regions occasional plants have been observed to attain a spread of over 10 feet.

Creeping rootedness is recognized as an important means of vegetative spreading in alfalfa. Stocks possessing this characteristic have the inherent ability of sending out lateral rootstalks from the main root. These horizontal rootstocks are usually found 4 to 8 inches below the soil surface. They develop buds at irregular intervals which later emerge and develop as normal shoots or stems. Each of these green shoots is capable of developing eventually into an independent crown and plant (Figure 2). Not all plants in a random sexual population tracing to creeping-rooted parents will express creeping rootedness. Those that do will vary in extent and density of creep and they may not show new plants until the second year, or later, following planting. Individual plants of strongly creeping-rooted stocks growing under ideal conditions in spaced plantings have been observed to give rise to several hundred spearate crowns and to attain an overall spread of 5 to 9 feet within a period of 3 years.

The creeping-rooted alfalfas were described more than 40 years ago, but because of relatively low yields little use was made of them in breeding programs until recently. The most promising breeding stocks of these are the progenitors of Rambler, a creaping-rooted variety developed by the Dominion Department of Agriculture in Canada. Rambler and related stocks are being tested and utilized in breeding programs in the United States. It is hoped that adapted creeping-rooted varieties may become a reality to farmers of this country within the next 5 to 10 years.

Limited observations in test plantings scattered throughout the country indicate that the rhizomatous alfalfas may not express their spreading habit over as wide a range of soil and climatic conditions as do the creeping-rooted types. Additional research is necessary to determine whether differences in expressibility of these characters do exist and what environmental factors have the greatest restrictive or conducive influence on them.

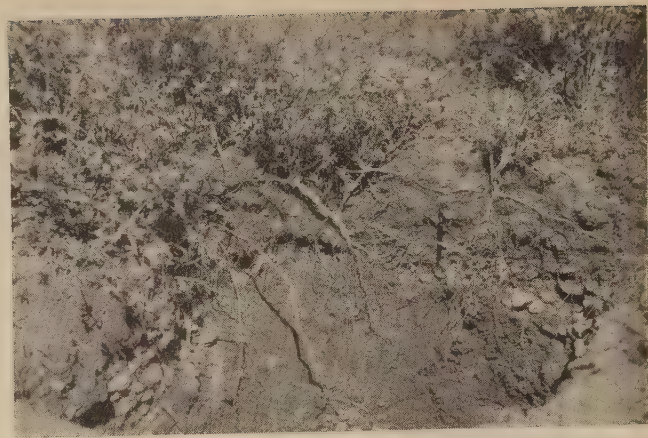


Figure 2.—A partially excavated 2-year old plant showing spreading in an experimental strain of creeping-rooted alfalfa.

The pasture-type alfalfas, like the hay types, do best on deep, fertile, well drained soils. However, there is evidence to indicate that when subjected to grazing, and diseases are not a problem, the rhizomatous and creeping-rooted types might have more drought resistance and greater stand persistence than the conventional hay-type alfalfas. None of the pasture types excel in disease resistance.

Joint Action Pays Off

By BUD F. A. SVALBERG

"WELL, we got the job done—and a good one it is too," Jim Fackrell said, as he grinned from ear to ear. He was referring to the new headgate and diversion structure in the Blacks Fork River at the head of the Blacks Fork Canal in Uinta County, Wyo.

For over a year and a half, Jim, as chairman of the Blacks Fork Canal Company, had his troubles.

They began in the spring of 1953. Fast snowmelt in the high Uinta Mountains caused the Blacks Fork River to go on a rampage. The old headgate at the head of the canal could not take the strain. The raging water soon washed around and beneath the south end of the struc-

Note.—The author is work unit conservationist, Soil Conservation Service, Casper, Wyo.

ture and poured the full flow into the canal. Part of the water broke out of the canal and started down through Bridger Valley, taking along fences, bridges, and everything else in its way. Other water continued down the canal, sweeping out the headgates. The greatest flood damage occurred on the Smiths Fork Drainage. Amazing as it seems, the full flow of the river was diverted by the canal over the divide separating these two drainages.

This unexpected flow, added to the normal high water at this time of year, put terror in the hearts of onlookers. The entire flood plain was covered by the reddish-brown raging waters, thick with debris and topsoil from several miles above. Violent torrents were cutting new watercourses, and damage was widespread downstream, to the point where Smiths Fork emptied into Blacks Fork—a channel big enough to take the onslaught.

Despite the heavy and costly damages caused by the flood, when it was all over the critical issue was the loss of the main headgate and diversion. People were accustomed to floods. This one was merely a larger one than usual. What made it different was the destruction of the headgate.

An explanation may be necessary to understand the people's reaction. High water in the spring for a period of about 6 weeks, usually from May 15 to July 1, is normal. Indeed it provides the water for irrigation. About July 1 each year the water ordinarily recedes to where irrigation is practically at a standstill. From this time on, the diversion and headgate are responsible for any additional water available. Through two-thirds of the growing season there usually is a water shortage over much of Bridger Valley.

The Blacks Fork headgate and canal divert water from the Blacks Fork River and carry it to 75 farms and ranches. They also supply the domestic water needs for the town of Lyman. On these 75 farm units, a total of 17,550 acres are irrigated by water passing through the headgate.

Jim Fackrell, and other board members of the Blacks Fork Canal Company—Ray Hooton, Gus Becker, and Ervin Larsen—really had a multiple problem to solve.

After a hurried appraisal of the situation, the board hired heavy equipment to make repairs and a temporary channel change. Thus, they diverted what little water remained in the river on down the canal. These efforts prevented a total crop loss for 1953 on the member units. Drought conditions prevailed throughout southwest Wyoming. Serious as they were, these drought conditions and the very light snowfall in the winter of 1953-54 were factors in forestalling still another serious flood in the spring of 1954.

Temporary measures for the immediate irrigation season helped but it was apparent that something more permanent would be required. From the 75 operating units in the canal company, upwards of 150 ideas and proposals had to be evaluated. In despair, the canal company board requested assistance from the Bridger Valley Soil Conservation District. The district approved the request, and in turn applied to the Soil Conservation Service for additional technical assistance to meet the crisis. A preliminary survey and report was made to the company. Out of it evolved a plan of operations, with everyone agreed that the job must be done right.

Surveys were completed the following fall and winter by the Soil Conservation Service, and design and specifications drawn up. At a special meeting of the company in March last year the question was reached: Where is the money coming from?

The threat of another flood was not too serious then, due to a subnormal snow pack in the mountains, and the members of the Canal Com-

All six gates on diversion dam are partly open, and stop logs in place, allowing desired amount of water to proceed down Lyman Canal.

pany voted to have their board of directors negotiate a loan with the Farmers Home Administration. By the last part of June there was the assurance of a loan of $18,000. A contract was eventually signed in the amount of $18,839.86.

Construction started in August 1954. The new structure was to be placed upstream about 500 feet, and the river channel changed to an old meander channel to compensate for this. During construction, the water in the river was diverted around the construction area and down the canal. The new headgate has six separate 42 inch x 72 inch gates, mounted in the framework of 113.6 cubic yards of reinforced concrete. The diversion is a gravity, cyclopean section of concrete across the river, whose elevation is the same as the bottom of the six separate gates. During periods of low water, stop logs can be laid against the retainers mounted in the diversion to increase the flow of water down the canal.

Harry N. Carlton, Soil Conservation Service engineer, who supervised the construction, certified its completion to the Canal Company in October, at a cost of $18,955.05.

While work was in progress, all members of the Canal Company signed a pooling agreement under the Agricultural Conservation Program. By doing this, the government shared in the cost of the structure to the amount of $4,105.71. Actually, it cost only 84½ cents per acre for each acre benefited—an amount small enough to please the most critical of the company, in view of the advantages offered.

In the past, $2,500 to $3,000 per year has been required for maintenance of the old structure and canal. This can now be reduced materially, and the savings used to pay off the FHA loan over the 20-year period.

Through the Bridger Valley Soil Conservation District, The Blacks Fork Canal Company has been able to utilize intelligently the services available, and accomplish their objective. The Soil Conservation Service, working through the Bridger Valley Soil Conservation District, made the necessary surveys, drew up plans and contracts, and supervised construction. The Farmers Home Administration financed the project. The Agriculture Conservation Program shared the cost in line with the principles of the 1954 program. Everyone can agree that Jim Fackrell has had his share of problems for the last 18 months. At this year's annual meeting of the Canal Company, Jim resigned as chairman. As his letter of resignation was being read to the meeting, his infectious grin carried the knowledge that his job had been well done.

Grass Replaces Wheat Without Loss of Income

By CHARLES C. LIMEBERRY

MANY ranchers in southeastern Washington are stopping erosion by transferring their steepest slopes from wheat to grass. This, in turn, builds soil fertility.

Stripcropping, contour farming, rough tillage, and other conservation practices have long enabled them to hold soil on sloping areas of cropland where otherwise they would have lost it. However, on their steepest slopes, these practices didn't always solve their erosion problems.

They knew, of course, that permanent cover would stop erosion. But to substitute grass or wheat would, they thought, mean loss of income, which would be particularly bad at a time when operating costs were soaring and farm revenues were sinking.

Now, since 5-year results have been racked up by Ward Hoskins, a grain and livestock producer, and by others who struck out boldly to

Note.—The author is a Soil Conservation Service technician assisting the Columbia Soil Conservation District at Dayton, Wash.

see just what would happen when they made the drastic shift, farmers in the Columbia Soil Conservatoin District are rapidly putting more and more of their steepest land into grass and are happy over the way it is paying off. Hoskins gave them the needed assurance when he found that "my permanent pasture, formerly good wheatland, is adding as much to my net farm income as it ever did when it was producing wheat." That is why he has increased the acreage of his steepest land from 8 acres in grass to 110 acres—all well protected because they are no longer in wheat.

The Ward Hoskins ranch, 6 miles north of Dayton, is of 320 acres—small as sizes run in Columbia County. Rainfall averages 17 inches

Once in wheat, this land is now in fine permanent pasture, well cross-fenced for rotation grazing.

annually, and it comes mostly in winter and spring. Soils are deep silt loams of very good productive capacity. Rolling hills have long slopes that range up to 40 percent. Wheat and green peas are the principal income crops. Ward has been operating here for 30 years, following his father, and all but 10 of his 320 acres were in wheat and peas before he started his grassland enterprise.

After watching the dark, rich topsoil give way to yellow subsoil, and shallow drainages become deep gullies as a result of erosion's sweep, Hoskins became alarmed and decided he had better do something about his soil losses. The first step was taken in 1949 when he developed a new operating program with the help of the Columbia Soil Conservation District, and seeded 8 acres to intermediate wheatgrass on steep land that Soil Conservation Service technicians had recommended for retirement from wheat. Hoskins tells what happened:

Sheep grazing on alternate-row seeding of intermediate wheatgrass and alfalfa on Ward Hoskins ranch.

"For some time I had been thinking about seeding pasture to carry my flock of 50 sheep. But wheat prices were good and I didn't see how I could afford to make this change. For a small test, I chose two 4-acre corner fields that were hard to farm so I wouldn't have much to lose. I really was surprised when I took 600 pounds of clean seed from one 4-acre piece and 10 tons of hay from the other. Productively, they were worth as much to me as if I had put the acreages in wheat and there were no soil losses where, in previous years, there had been severe washing."

His decision to expand his grassland came in 1951, when many farmers were plowing grassland and putting it into wheat because acreage restriction had been lifted. Ward met that situation by seeding 100 acres of his steepest cropland to intermediate wheat grass and alfalfa. Most of this acreage was in one block where he could establish good management practices and not interfere with cropland cultivation.

He already had decided that sheep were his best bet in a livestock program. When he doubled his flock size by purchasing 50 purebred ewes, there was a "great shaking of heads" because cattle prices were high, but it proved to be a wise choice.

Today Hoskins has 200 acres in cultivation; half in wheat and half in Austrian winter peas which are plowed under annually for green manure. He has 110 acres in permanent pasture and keeps a breeding flock of 325 sheep on the ranch year-round. Permanent pasture is fenced into 8 units, which supply 6 months of deferred rotational grazing. Peas and wheat

(Continued on page 112)

Story of a Small Ripple That Sp

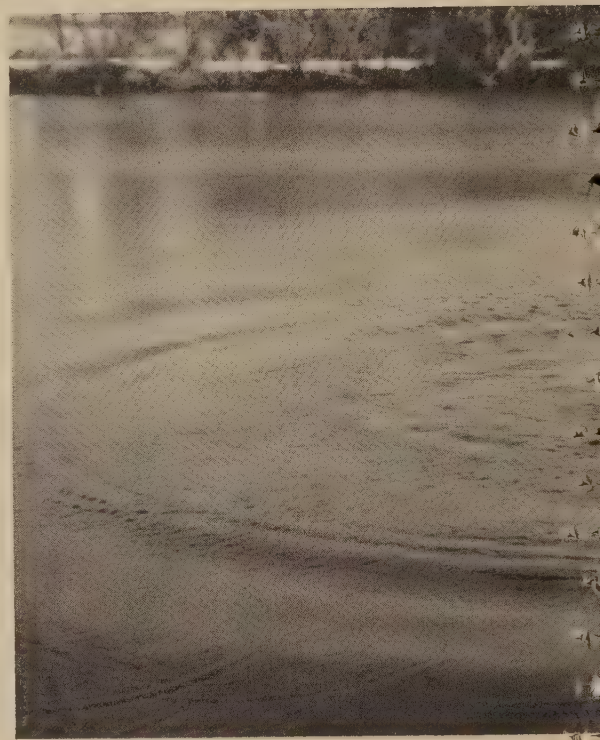
HAVE you ever noticed the ripple that your fishing line or a pebble makes on the surface of a still pool? The next time you get a chance pay particular attention to this characteristic of water. Even the smallest water flea—one that you can scarcely see—makes a ripple when it lands on the surface of a pool. The ripple starts at the center and spreads all around.

So it is in an area such as the West Box Elder Soil Conservation District in which water for irrigation is a major problem. Even the smallest improvement makes a ripple that is felt not only by the individual owner but by his community, his state, and his country.

Let me tell you how this characteristic of water was brought to my attention. During the summer of 1948 a partnership, composed of my father, brother, and myself, drilled 4 shallow pump wells—the beginning of a water development program that was to grow to include 8 wells that produce enough water for 300 acres of good bottom land that formerly produced little more than a rank growth of sagebrush. The drilling was done with the idea of producing a series of shallow wells for cheap pumping so that the stream from 2 or more wells could be combined to give a good irrigating stream.

If you were to compare this water development on one ranch to some of the larger projects that we hear so much about, you might imagine that it is of no importance. But, we also might compare it to the flea, no matter how small. You can still watch the ripples spread.

Let us start at the center of our ripple. What has this new water development meant to me? It has given me means to make a good livelihood without leaving my home community, as so many of my friends have had to do, because while we have lots of good soil, water for irrigation is a limiting factor. It has given me the opportunity to enjoy a rare and very pre-



Ripples on a pond in the West B

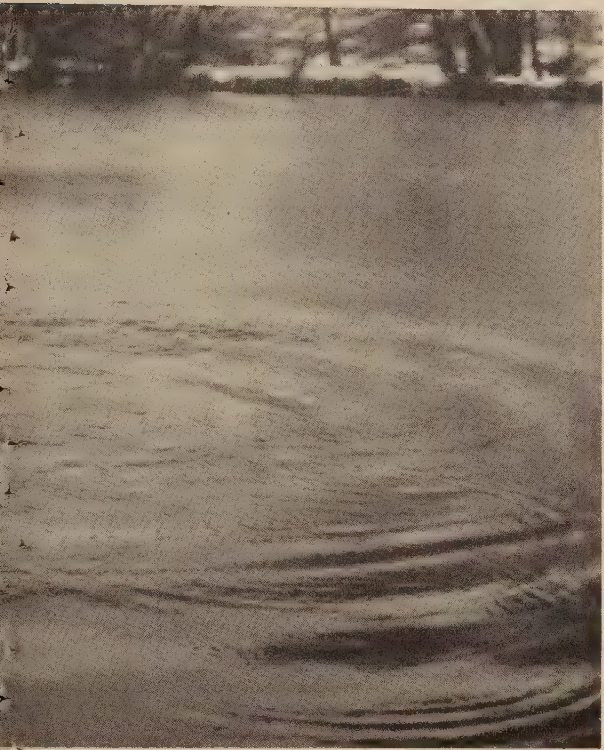
By REESE D

cious association with my family—my parents, brother, and sister.

What has it meant to our family and our family business? No longer are we faced with the yearly squeeze either way, being caught short of feed for our cattle during a long hard winter, or being caught short of water to raise a new crop the summer following a light winter. No longer are we forced to leave a poor stand of alfalfa, long after it should be plowed under, simply because, due to the water short age during late summer, it is a major accomplishment to plant and save a good stand for hay. Even after a drought year such as 1954, when our district was declared within a disaster area, we were able to produce a short crop of hay. It enabled us to feed through the winter without having the additional financial

Note.—The author is a supervisor of the West Box Elder Soil Conservation District, Grouse Creek, Utah.

ead...and Spread...and Spread



Elder Soil Conservation District.

WARBURTON

burden of buying more hay or being forced to sell our basic cow herd with the resulting blow to our business. Water development gave us a good base to which we added rangeland to give us year-round ranching operation, a cattle business that is a means of a good living for us all. We have remodeled and built up the ranch living quarters. The home now has water under pressure, electricity, and nearly all of the appliances that make for better living.

Now let us see how those ripples spread from the center. The development of the water was immediately felt by the pump and machinery dealers, for it takes pumping equipment as well as tractors, drills, levelers, and all the harvesting equipment that is required to farm the modern way. It was felt by the neighborhood banker, grocery store, school, and church. The county assessor and state tax commission also notice the ripple via increased valuation of those acres as well as on the equipment needed to farm them.

The carpenter, plumber, electrician, and lumber, hardware, and appliance dealer felt the ripple when the ranch buildings were built and improved. The fuel and oil dealers noted the ripple by increased sales of those products. The sportsman also feels the ripple, for where there was only 1 duck, 1 pheasant, or 1 prairie chicken, now there are 10, and feed for many more.

We used diesel pumping plants on our wells the first 3 years, after which a three-phase power line was constructed to bring electricity with all of its modern conveniences and services that help to make modern living. It seemed that those spreading ripples had influenced the directors of the electric co-op to furnish power for wells in developing of underground water of our area.

So it was that a committee of community leaders realized a dream come true. This committee, along with our neighboring communities, had been working for 5 years trying to interest different power companies in bringing power into our area. It resulted in all the conveniences of living in this modern age for several communities and outlying ranch homes.

The electrician, repairman, appliance salesman, as well as a host of other people who have goods and services to sell, all felt the ripples as they spread again. More dramatic than usual, perhaps, but still an example of how the ripples spread and are felt by the neighboring communities.

We are working toward the solution of the water problems on our ranch that will start more ripples. An irrigation company, in which we have an interest, is well through the technicalities that go into preparations for building a dam that will provide winter storage for water which can be more beneficially used during a growing season. At present the stream, with which this company is working, is fed by springs which produce an even flow of 3

second-feet year-round. This flow is controlled by an old reservoir which can be filled in 10 days before the flow starts to move through it. During nongrowing months this overflow is spread over pastureland and meadows in an attempt to get some value out of it. However, we realize that we cannot get effective use of all available water until we have good storage facilities.

We have a good site for storage of winter flow and some early spring runoff, at a cost that will produce a sound investment. If built according to present plans, it would bring irrigation to an additional 800 acres. Watch the ripples spread—a lot of new ripples to touch the rancher and his family, hired help, community stores, school, church, and everyone who has goods or services to sell. The ripples never stop for the effect of them starts an endless chain of new ripples.

This storage reservoir was a dream of ranchers in my father's generation. They investigated the possibilities. They were faced with the problem of food and clothing and education for their families, equipment and seed for cropping, cultivating and harvesting, and other expenses in ranch operations. All of these things had to come out of the return from farm crop production that could be sold in our free enterprise system. Usually it requires a lot of careful planning before the average rancher and farmer can see their way to invest such a large sum as would be necessary. Small wonder, then, that these ranchers, when they learned the cost of the dam, turned without a word and walked away with shattered dreams falling around slumped shoulders.

All of the older ranchers, except my father, have sold out. Young men of my generation have bought the ranches and inherited the dream of a storage reservoir—and its problems. Will they leave the building of that dam for the next generation? No. Through their West Box Elder Soil Conservation District they receive very valuable services and reinforcements. Among these are the Soil Conservation Service technicians who have come in to investigate the problems. In response to requests that ranchers have made to their soil conservation district, these technicians—engineers, geologists, agronomists, soil scientists, and others, including irrigation specialists—are digging deep into all soil and water conservation possibilities as they become acquainted with the ranchers, their land, and overall needs.

Part of the streamflow is necessary for culinary and stock watering purposes, a loss of storable water for irrigation. To avoid this loss the technicians and ranchers together are considering the drilling of wells for culinary and stock watering purposes and let all streamflow go into storage. The ranchers of the company are now striving for a common goal. After 2 years of cooperative work, our ranchers have developed confidence in these men. They also have found that their soil conservation district will stay with them, because *they* are the district—will help plan the dam, establish the irrigation system, and instruct them in the proper application of the streamflow. And they know that their district will stand by and help them with maintenance and operating problems. This time they are certain, the long held dream is going to become a reality.

These services are also available for protecting the small watershed and establishing control of runoff that eventually, if unchecked, would fill the reservoir with eroded soil. Springs and waterholes may have to be improved and maintained to better distribute livestock and wild game, which would result in the improvement and maintenance of grass and other cover that keeps the soil up on the watershed. This program means that rain and snow runoff will be controlled, starting where it begins. Instead of a tremendous water and silt flooding that does a lot of damage to everything in its path, we will have a smaller flush spread over a longer period, and an increase in the flow of springs that feed the stream from which irrigation water comes. Spreading ripples from this general project will save money for every taxpayer — homeowners who have suffered heavy annual losses in damage to land, buildings, and roads. It means more and better grass cover for wildlife. Streams will have more and clearer water; more fish to take the angler's lures. The Fish and Wildlife Service is actively cooperating with ranchers in planting young fish in streams and helping to control rabbit damage. This is one example of how organizations and ranchers work together through the West Box Elder Soil Conservation District.


Ross Warburton and his son, Reese Warburton.

Let us consider present development of our company storage project with development of the wells on our ranch. We began that underground water development 3 years before the West Box Elder Soil Conservation District was organized by the votes of the ranchers. During those 3 years we spent a lot of time in study, and considerable money. This effort involved a special study of underground water and geology while I was a student at the University of Utah. It required considerable travel and investigation; many things that the average rancher doesn't have opportunity, time, and means to do. We made good use of bulletins and other printed reference material supplied by the Extension Service. These helps, though very valuable, were not enough. We needed guidance in tying theories down to our own individual problems in all of their varying phases. It wasn't available at a price we could afford to pay.

Now contrast that situation with the services and assistance that we have through our West Box Elder Soil Conservation District and its cooperating technicians. The answers to those problems are right at our doorsteps. The technicians come to our ranches and work with us; give us the benefit of their skill and experience which is backed up by the laboratories, tests, and experimental plots of government agencies and the practical knowledge gained from work with thousands of farmers and ranchers. That is why I have a deep appreciation for my soil conservation district and why I support it so enthusiastically.

The district was organized to place the primary responsibility for local soil and water conservation on the landowners. It is legally charged, as an arm of State Government, with planning the programs, obtaining the information, procuring the services, and doing the things that citizens working alone would not be able to do.

Our district is recognized as a clearing house for improved agricultural practices that enter into soil and water conservation, watershed protection, and flood prevention. It is a practical medium through which influences and assistance of local businessmen, nonagricultural landowners, professional groups, local, county, State, and Federal agencies, and many other groups or individuals, are brought to bear in an effective and constructive manner. It is the best organization yet devised to get the overall soil and water conservation done.

In the West Box Elder Soil Conservation District's operating program, which was set up when the district was first organized, water conservation projects such as pipe lines, irrigation structures, canals, diversion and storage dams have first priority, with grass and range management next in line. In 2 years, despite setbacks received from low cattle prices, droughts, and so on, our ranchers, with the help of their district and the Soil Conservation Service technicians have made a very good start in solving their water and grass problems. For example, they have excavated 143 miles of ditches, built 21 ponds, 43 stock water facilities, and 52 headgates. They have improved water application on 1,200 acres and obtained engineering surveys on 24 proposed storage dam sites.

One large water conservation project has been completed by the Fisher Creek Irrigation Company at Park Valley, Utah. It includes 3.4 miles of 15-inch concrete pipe with all of the necessary diversion and distribution structures. There is no loss of valuable water now, as contrasted to the loss that occurred before this improvement was made. Records of a test made before the project was started indicated a loss of 80 percent of the water at a point 2 miles

below where the pipeline now starts, and a loss of 99.3 percent at the point where the pipeline now ends. Almost unbelievable, isn't it? This is one example of some of the potential water conservation possibilities of our district.

In spite of the drought, ranchers by use of water from this pipeline were able to harvest at least half of an average crop of hay in 1954. They also had livestock water in their pastures and drinking water, where likely there would have been none. Watch the ripples spread. They never seem to stop.

This pipeline project was financed mainly through the Utah Water and Power Board and its revolving fund. The Agricultural Conservation Program Service also gave substantial help through its cost-sharing program. The Utah Water and Power Board loans money on a longtime basis, with no interest, to groups of people for use in water conservation developments. Citizens who support this fund think of it as an investment in the future of our state. The board recognizes that water conservation practices, such as the Fisher Creek pipeline, involve a heavy initial cost that the individual landowner sometimes is unable to meet, and the project, though it is vitally needed, is left for the next generation. Thus, we see county, State, and Federal agencies working together. It is a policy that puts a lot of new ripples into action.

Almost everyone has read about towns and cities raising funds to attract new industries. Often they have totally ignored the welfare of an industry that they already have, an industry that contributes importantly to the welfare of the area—agriculture. Often they are unaware of the characteristic of water—how ripples spread from conservation of water, whether it is for irrigation or stock use, or for watershed protection and flood prevention.

As I understand the situation, a soil conservation practice is considered to be a poor one unless the farmer or rancher gets a return of $2 for every dollar that he spends in establishing and maintaining it. Moreover, it has been estimated that farm dollars are created wealth and that they turn over seven times before they complete their cycle. This means that every dollar produced on farmland puts $7 into circulation. I believe that expanded farm income will increase money in circulation many times more than most towns and cities will ever be able to get through industrialization.

One of my father's favorite sayings is: "There are two kinds of people in this world of ours—first, dreamers, and second, dreamers and doers, and I like to think that I am a dreamer and a doer." Don't we all?

Yes, we all have our dreams. They may be a farmer's dreams of ample irrigation water; the businessman's dreams of more orders and more production; the industrial worker's dreams of a fatter pay envelope; a banker's dreams of more deposits, more money to invest, more dividends; a housewife's dream of new labor-saving facilities that will take some of the drudgery out of her work; a sportsman's dreams of better hunting and fishing—dreams of better opportunity, even a land of plenty for our children. No matter what our dream may be those spreading ripples touch them all. But it takes a lot of doing to start those ripples.

We should all support conservation of water and soil and learn for ourselves what a soil conservation district is and what it is trying to do. The importance of soil and water conservation and development has been established. The farmers and ranchers of our soil conservation districts with the assistance of cooperating technicians and others who have helped are doing a good job in starting those ripples to spreading. We are all vitally concerned in keeping those ripples spreading in a way that will benefit everyone—our communities, our state, and our country, now and in the future, to make us all stronger economically and spiritually.

GRASS REPLACES WHEAT

(Continued from page 107)

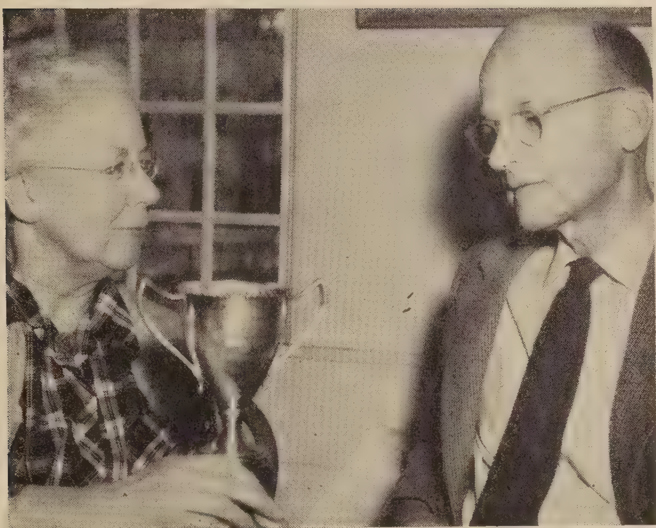
stubble yield 2 months grazing. During 4 winter months sheep feed on pea hay bought from neighbors at $25 a ton.

During the past 3 years, wheat production has averaged 40 bushels per acre. A lambing percentage of 125 has allowed annual marketing of 300 fat lambs and furnished replacement animals. Each of the 325 mature animals has produced 12 pounds of wool annually. Hoskins' gross income from sheep has averaged about $7,800 yearly.

(Continued on page 119)

Writing Team Befriends the Land

By LESTER FOX



The Houghs and their silver cup.

MR. AND MRS. HENRY BEETLE HOUGH, editors and publishers of the *Vineyard Gazette,* are poets at heart. And poets are naturally conservationists. They don't like to see any of Nature's handiwork destroyed or damaged.

It's no great wonder, then, that Mr. and Mrs. Hough have won permanent ownership of a silver cup offered by the Dukes (Martha's Vineyard, Mass.) Soil Conservation District to the one doing the most to help in the wise and productive use of soil and water resources.

The cup had to be won three times for permanent ownership. One-time winners have been E. B. Keith, W. W. Piney, A. M. Fischer, and James Cagney, the actor. They all had 1-year possession of the trophy for conservation work they did on their farms.

Ever since they bought the *Gazette* in 1920 when it was 74 years old, the Houghs enlisted the interest of islanders in the good use of their natural resources.

"We've always been interested in conserving our forests and wildlife," Hough said. "Then when the Soil Conservation Service came into being, we learned of the need of conserving our soil and water resources. The coming of the SCS gave us the first definite opportunity to work for the conservation of our natural resources on a comprehensive front.

"It has been a great satisfaction to be able to tie in with the effective leadership the Soil Conservation Service has provided. The SCS has given us a comprehensive program of action that we can put our teeth into. It advanced the whole field of conservation from the theoretical to the practical, from the abstract to the concrete.

"Soil Conservation Service men are out in the field where they can see what's happening and what ought to be done and can be done. They make the whole business of conservation real and immediate."

The Houghs have no farm on which to practice what they preach but they do own a 10-acre piece of land around their home in Edgartown, where they publish their newspaper. They are developing this into a wildlife refuge with the help of Ezra Shaw, the SCS technician for Martha's Vineyard and Nantucket.

In developing the *Gazette* into a famous newspaper, the Houghs have successfully defied a number of journalistic bugaboos. They have shied away from the nervous, rapid fire type of writing thought necessary in these days of fast living when everyone is supposed to read and run. Instead the writing is leisurely and the general tone poetic. In fact they publish poetry as it comes in, a practice that would give most city editors the horrors. And most of it's good stuff.

The old-fashioned idea of putting advertisements on the front page does not disturb the Houghs. They have a sensible reason for doing so: it enables them to provide a better balance of news and ads on the inside pages.

The Houghs have the odd idea that the public is interested in something besides murders, accidents, scandals, juvenile delinquency, and

Note.—An article on the Houghs' promotion of conservation farming on Martha's Vineyard appeared in the February 1953 issue of this magazine.

Collie Dundee Bold leads way on stroll at edge of pond.

other forms of abnormal behavior. This sort of news the *Gazette* prints if and when it happens but it's written with a sense of proportion. And with it *Gazette* readers get news and observations about birds and wild flowers, schools, literature, music, the tides, and the little animals of the island. Letters from readers are often literary gems. Islanders traveling abroad send back vivid and mature accounts of their observations. Current events, whenever appropriate, are linked with the colorful past of Martha's Vineyard and its adventurous captains of the sea.

A subscriber's masterpiece on the futility of the tomato as food brings a flood of responses as bright and humorous as the original.

Readers show their interest in this kind of newspaper by subscribing for it in large numbers. The Houghs have increased circulation almost tenfold. Many of the summer visitors, for whom the Houghs publish their newspaper twice a week in July and August, are regular subscribers. Half the circulation is off-island. The *Gazette* goes all over the world.

The Houghs, both graduates of the Pulitzer School of Journalism, Columbia University, provide a training ground for beginning journalists.

"My wife," Mr. Hough said, "has exceptional skill in developing writing talent in others and in disciplining their minds without ruining their enthusiasm and originality."

Peter Bunzel, for example, is a recent *Gazette* graduate. After his apprenticeship there, he went to *Life*.

William J. Jorden had his first newspaper experience as a summer reporter on the *Gazette*. He became Tokio correspondent of the *New York Times*. William Attwood became foreign editor of *Look* and Howard Young went to *This Week*.

Phyllis Meras, a Wellesly graduate, was slated to be a school teacher until she got a taste of newspaper work as a summer vacation reporter on the *Gazette*. She went from the island weekly to the woman's page of the *Providence Journal*.

Then there were the three nieces of the late great drama critic and author, Alexander Woollcott: Barbara, Joan, and Polly Woollcott. All started newspaper careers on the *Gazette*.

Barbara went to the *New York Herald Tribune* and wrote a book, "None But the Mule," before she married John J. Scannell. Curiously enough, Scannell became chief mechanic on the *Gazette* and brought Barbara back to the island to live. They named their home "God's Pocket."

Joan Woollcott graduated to the *Philadelphia Bulletin*. She married Fritz Jennings who teaches in Philadelphia.

Polly Woollcott married an artist, Stan Murphy, who decided that Martha's Vineyard had the right atmosphere for a painter. Like sister Barbara, Polly became a permanent resident of the island.

Henry Hough himself has developed his writing talent on Martha's Vineyard. He has written half a dozen or more novels, a couple of nonfiction books, and numerous magazine articles. His best selling "Country Editor," published in 1940, is still in demand. It revealed him and Mrs. Hough as the kind of thoughtful persons who would naturally give unstinted support to conservation.

Soil and Water for the Future

By D. A. WILLIAMS

OUR national soil and water problems stem from our people—the 166 million we can count today, plus the added millions that population experts say we must figure on annually for an unforseeable period. All the people are dependent on the soil and water resources of our land for their daily living.

This is a continuing proposition. It has been so ever since our country was settled. It will continue so into the unforseeable future. It is now estimated that by 1975 we will reach an upper limit of 225 million people.

The significance of this population growth is far reaching. Our growing country must be supported from our present agricultural lands because most of our new land frontiers were crossed some years ago.

While the immediate future confronts us with pressing problems of surplus production of many commodities, I am convinced that those of us concerned with resource protection and development have an obligation to take a long-term view of our resources in terms of population growth. Abundant agricultural production is so important to our continued existence as a free nation that we cannot run the risk of failing to look far enough ahead.

How well we do in meeting the future demands on agriculture will depend in large measure on how we manage the soil we now have and the water resources related to them.

The national conservation problem is to protect and improve the agricultural land we have for efficient production on a sustained basis. Across the Nation generally we are making good progress in applying soil and water conservation measures to the land. Accomplishments have been substantial and they are on the increase.

But the conservation job is far, far, far from being finished. We must further step up the rate at which soil and water conservation practices are being applied on the land throughout the country. The problems still with us are varied and complex and they are being vigorously attacked across the Nation through soil conservation districts. One problem difficult to get at has to do with the withdrawal of good agricultural land to nonagricultural uses.

Some of our best agricultural land has been and is being withdrawn to nonagricultural uses. More than 115 million acres are currently occupied by cities, highways, roads, and railroad rights-of-way, defense establishments, factories, mines, airports, parks, etc. About 80 million acres of this was originally good cultivatable land. Many people are becoming alarmed by the current rate of conversion of good land to nonagricultural uses. It is often the best agricultural lands that are being diverted to suburban developments, highway growth, and industrial expansion. They are usually the most desirable for such development because of topography, drainage, and other natural features. These factors contribute to cheaper construction and maintenance costs.

During the last 6 months we in the Soil Conservation Service have made a nationwide appraisal of nonagricultural land encroachments to develop a current and reliable measure of the scope of this problem. In most states estimates were made county-by-county and I believe that we can put confidence in these figures. Estimates were made for three 5-year periods: 1942-46, 1947-51, and 1952 through 1956. The rate of withdrawals has accelerated during the last period compared with the two previous periods.

I, personally, was amazed to find that our appraisal throughout the country indicates the trend of withdrawal of cultivatable land from agricultural uses is more than double what we thought it was. During the past 15 years our estimates show about 17 million acres of our flattest and most fertile farmlands have been converted to nonagricultural uses. Each year over 1 million acres of cultivatable land is going into homesites, industrial and commercial devel-

Note.—This article is based on an address by the Administrator of the Soil Conservation Service, at the annual meeting of the National Reclamation Association in Lincoln, Nebr., October 26, 1955.

opments, defense establishments, highways, airports, and other nonagricultural uses. During the same 15-year period an additional 3 million acres of cultivatable land is estimated to have been converted to commercial pulpwood production in the South. This acreage is primarily in Georgia and Florida but extends to other Southern States. The production of fiber products is. of course, necessary in our expanding economy. Many of these holdings are owned by paper companies who expect to stay in this business for a long time so, for all practical purposes, this land is not available for cultivation or pasture.

This changing land use pattern has gone on largely unnoticed except in areas where it has been accelerated during the last few years to such an extent that it is recognized as a matter of public concern. The withdrawals the past 15 years represent almost 3 percent of the total land suitable for cultivation in the United States. If the withdrawals continue at the present rate for another 15 years, a total of more than 100 million acres of land which was once suitable for cultivation will have been retired to nonagricultural uses.

One million acres of the best cropland in each of the States of Ohio, Indiana, and Texas have been withdrawn for nonagricultural uses in the last 15 years. Over three-quarters of a million acres have been lost in each of the States of California, South Carolina, Michigan, New York, and Oklahoma. Conversions of cultivatable land in the western Corn Belt and Great Plains are generally at a slower rate than in most other parts of the country.

Of the total cultivatable land withdrawals, about two-fifths went into such public uses as highways and airports, military and defense establishments, reservoir, recreational, and similar uses. The other three-fifths of the land diverted from agricultural use to nonagricultural uses went into private developments, cities, industrial, and other uses. About one-quarter of this private development was for commercial pulpwood and timber production. This major shift in land use during the past 15 years represents the equivalent of cropland on 225,000 average sized American farms. It is only reasonable to assume, because of the location of these farms to cities and industrial areas, that the actual number of farms is greater than this.

The problem in California has probably received more widespread attention than in other parts of the nation. Over 1 acre out of 7 of land suitable for cultivation in the State is now in nonagricultural use. The situation has been so acute in some spots in the State consideration is being given to regulation of areas which may be converted to nonagricultural use.

What will the future trends be in this respect? It is only reasonable to surmise that with the continued rapid growth of suburban developments, superhighways, industrial expansion, etc., that the withdrawal of good land from agricultural use will continue and accelerate, perhaps, in the years ahead. If continued at the present rate, this withdrawal could have a substantial bearing on the future ability of agriculture to meet demands of the Nation.

Some of the loss of good cropland, however, through nonagricultural encroachment is unnecessary. There is plenty of other land not suited to crops available for many of these uses. In some affected communities the question constantly arises as to whether zoning ordinances could be used effectively to protect the Nation's good cropland from being diverted to other uses. Attendant with the actual breaking up of farms is higher taxes and labor costs for remaining farms and other dislocations which affect agricultural production.

I am sure that I do not know the answer. But, it has become apparent that the problem of land withdrawal from agriculture has become an important part of the overall national conservation problem. We need to take a longtime look at this along with other land problems to see it in its proper perspective.

We can't stop the wheels of progress. We will continue to need living and working space for our increased population but we can plan for intelligent use of land devoted to these purposes so as to maintain our agricultural plant.

It seems self-evident that the national conservation problem is of considerable magnitude and of direct concern to all citizens in cities and towns, and on farms and ranches.

The final responsibility, of course, for carrying out a sound vigorous program of soil and water conservation rests with the people who own and operate the land. A national conservation program, however urgent its need, cannot have force in a democracy unless it is ac-

cepted as the individual responsibility of the man who uses and manages the resources.

We have learned from experience that the success of the soil conservation program depends upon local responsibility and leadership. The soil conservation district has proved to be an effective mechanism through which local responsibility and leadership in soil and water conservation can be assumed and local needs and desires can be made known. Because soil conservation districts are local units of State government, organized and controlled by local people they are a highly effective device through which government can serve farmers without dominating them. As you know, the technical services of the Soil Conservation Service are made available to farmers and ranchers through soil conservation districts.

Your Reclamation Association has recognized the role of districts from the outset and has cooperated with them. A large number of reclamation projects are using soil survey data as a basis for their development—data gathered by the Soil Conservation Service through soil conservation districts. Land capability inventories have helped determine what land in proposed projects would be suited for irrigation, and the best kind of irrigation, land treatment, and cropping that would be needed to insure safe and most productive use of land.

One of the real significant items of progress, in my opinion, has been the growing understanding of the importance of water in agriculture and the entire national economy. We are now beginning to recognize that water is life itself, both physical and economic, not only in the West but throughout the entire Nation. It is becoming apparant to more and more people that water will become a significant limiting factor to expanding agricultural production and the growth of our entire economy in the years ahead. Our future progress as a Nation will depend in a large measure on our success in managing our water resources.

We are now in the stage of competition, not only for the use of water, but for the right to use it. Interstate compacts are developed to divide up available water supplies among compacting states. Industry is carefully evaluating location in relation to available water supplies.

It is estimated that the total withdrawal of water for all uses in the United States has doubled twice in the last 50 years. We have every reason to expect that the total demand for water will double again within the next 25 years . . . if not sooner. Our needs for water are now such that we must seek the maximum utilization of all water from the time rain and snow falls upon the land until the water finds its way again to the sea.

It has become apparent that water management will become one of our most important conservation activities of the future. Water management must begin where the rain hits the earth and the snow begins to melt because all of our water for all uses is supplied from the clouds in the sky.

Water in streams and wells, and in storage reservoirs for towns and cities, and for irrigation is merely an accumulation of rain and snow that once fell on the land. Water management must start with the right land use for each kind of land and the application of needed conservation practices to prevent erosion and conserve water.

It has also become apparent that water development and management are inseparable from land management and use. The water element cannot be separated from the soil element in a successful conservation effort. Wherever useful plants are grown, water is needed to grow them. Wherever water is used, there is, without soil conservation, some degree of troublesome soil erosion. The soil and water problems on irrigated lands of the West reach in an unbroken chain from the watershed source of the water to the lower end of the farthest fields in the districts where the excess irrigation water finally drains away.

Sediment, the product of soil erosion, is a serious threat to the progress of irrigation farming. As reservoirs fill with sediment, as canal maintenance costs rise, a heavier burden falls on the water users. Irrigation farming without soil conservation measures to offset the threat of sedimentation, will weaken and gradually decline.

Sedimentation, however, is not our only problem in irrigated areas. The overall irrigation efficiency has been estimated to be less than 30 percent in most states. Nearly one-half of the water diverted from streams is lost in conveyance and half of that delivered to the farm is lost before the water gets to the plant roots in many irrigated areas. In spite of this low efficiency, about one-half of the irrigated area suffers a water shortage every year.

One of our big opportunities for the future rests in getting more efficient use and distribution of water already available. Proper repair of irrigation systems and proper water management applied to the irrigation lands of the West could substantially increase the total water supply for irrigation. We in the Soil Conservation Service consider the job of assisting in improving the efficiency of water use and management as one of our primary jobs in irrigated areas. We believe our accomplishments toward this end are significant.

In the 17 Western States, for example, we have assisted with improved water application on about 4½ million acres of irrigated land. We have assisted with

improved water management for irrigation on an additional $1\frac{1}{4}$ million acres. We have assisted in land leveling for irrigation on about $3\frac{1}{4}$ million acres. We have assisted in the installation of about 26,000 sprinkler irrigation systems and 84 hundred reservoirs. We have assisted in more than 2,000 group irrigation jobs comprising about 2 million acres on which nearly 6,000 miles of farm ditches and supply canals have been installed.

I recently reviewed a report evaluating this type of accomplishment in southern California. The efforts of our technical staff in this particular district had resulted in the reduction of over 3,000 acre-feet per year in water use in an area where water supplies are rapidly becoming critical. At the price commonly paid for extra water in this district, the savings was valued at more than one hundred thousand dollars. The saving was estimated to be enough water to irrigate at least 1,000 acres of citrus.

I should like to emphasize, too, the importance of drainage on irrigation lands. Drainage, to a greater or lesser degree, is a necessary part of every irrigation system. Seepage losses from canals, surface runoff, and deep percolation from farms are all sources of water which accumulate in the lower areas and cause waterlogging and salinity. The salt problem in many irrigation districts is insurmountable without adequate drainage.

The point I am getting at is this. Too many people have the concept that once water has been delivered to a farm for irrigation, the farmer enters a state of permanent stability and prosperity. As you well know, those just aren't the facts. It is the purpose of the Soil Conservation Service in irrigated areas to assist in the solution of problems that are encountered after water is delivered to the farm. I believe that you in the Reclamation Association must have a positive interest in this work because it has a direct bearing on the future prosperity in reclamation projects.

The Soil Conservation Service is vitally interested, too, in meeting the technical needs of settlers on new irrigation projects essential to getting their new farms into efficient operation. In many instances, such as in the Columbia Basin, the Missouri Basin, and other new projects, the Service has been able to assign sufficient technical personnel to project areas to meet these needs, without taking such assistance away from established projects.

The Department of Agriculture has recognized the problems. So have the Bureau of Reclamation, the Bureau of the Budget, and the Interior and Agriculture appropriations committee in Congress. They all agree that something should be done about it, but there has been lack of action because of jurisdictional questions.

The increasing importance of water in agriculture outside of the West is of great significance today. In the humid area of the United States we are losing about one-third of the annual rainfall through runoff. At the same time farmers in many localities in recent years have suffered severe crop losses due to the lack of adequate rainfall.

Consequently, we have a twofold development in water in these areas. On the one hand we have more and more farmers who are becoming aware of the importance of soil conservation practices that conserve moisture and make more efficient use of it. On the other hand we are on the threshold of tremendous activity in supplemental irrigation.

The medium and large rivers and streams in the Eastern United States that flow continuously year-round number well over a hundred. Adjacent to these streams is a total area of well drained rich valley land in excess of 50 million acres. There are thousands of farms in the humid States where water is available and where the necessary investment for supplemental irrigation might pay off. More and more farmers are becoming aware of these facts, and many have already invested in systems for supplemental irrigation.

Because most of the expansion in humid area irrigation has aken place since the last census was taken in 1950, accurate figures that will indicate the total growth are not available. There have been some judgment estimates made, however, which from our experiences in assisting farmers seem sound. These estimates indicate that supplemental irrigation has increased about 500 percent since 1950 and that more than 1 million acres are currently being so irrigated in Eastern and Southern States.

The severe drought during this period was undoubtedly a major factor in this development. But, it hasn't been the only factor. The advent of quick coupling, lightweight aluminum pipe has certainly made irrigation much easier, and the increasing demand of the American consumer for crops of high quality has emphasized the need for soil moisture control. The high costs of crop production have also indicated a need for the more stable farm economy that can be obtained with irrigation.

The opportunities for using river water to supplement rainfall on the rich valley lands of the Eastern United States are enormous. To me, it seems inevitable that those opportunities will become related to our watershed protection and flood prevention work in the years ahead.

As you know, the 83d Congress enacted Public Law 566, the Watershed Protection and Flood Prevention Act. This law provides a new authorization for approaching soil and water conservation problems on a watershed basis. It provides means for bringing the water element into balance with the soil element in our National soil and water conservation program. It is an implementing tool to our going program.

The primary objective of this Act is to provide the basis for local groups of people to cooperate with and receive assistance from the Federal Government in solving their flood prevention and water management problems in small watersheds.

The Act authorized the Department of Agriculture to cooperate with States and local agencies in carrying out jointly planned and mutually agreed on flood-prevention and water-management projects. It places responsibility on local organizations to initiate projects adapt plans to local requirements, share in the costs, and make provision for the plan's application and

maintenance. We have a new opportunity to work on problems that require group action that have been difficult to get at.

These opportunities are great in the Western States as they are in other parts of the country. The act recognizes the inter-relationship of land in irrigation projects and the tributary watershed lands above them. I would encourage you who are interested in reclamation to explore fully the opportunities that are present for the development of private irrigation enterprises through the Watershed Protection and Flood Prevention Act.

You will be interested to know that we are finding many watershed groups interested in a combination of irrigation development and watershed protection to an extent greater than provided for in this legislation. This interest undoubtedly had a bearing on the legislative proposal currently before the Congress for additional authorization for financing small irrigation projects in cooperation with local people.

Let me make clear the position of the Department of Agriculture on that matter. The Department recognizes fully the urgent need for moving ahead more rapidly in soil and water conservation, watershed protection, flood prevention, and small irrigation project development. We recognize that the problems involved are interrelated and that among the significant factors involved are adequate credit, adequate onsite technical assistance, and adequate research in soil-water-crop relationships.

The Soil Conservation Service stands ready to participate whole-heartedly in a practical cooperative approach with all agencies and organizations that can assist in rendering a more effective service to local groups interested in the development and protection of soil and water resources.

GRASS REPLACES WHEAT

(Continued from page 112)

In pointing up this development, Hoskins says: "All costs in my livestock operations—fencing, water developments, winter feed, labor, and so on, are charged as expenses against my grasslands. All the costs of cultivation, harvesting, machinery, etc., are charged against my cropland. The 2 months of grazing that my sheep obtain on cropland are charged against my grassland operations at the rate of $2.50 per animal unit month, the current pasture rate in this area. In final results, my cropland brings in more gross income per year, but when it comes to net farm income, I put more in my pocket from grassland operations. If I were to make an acre-for-acre comparison—cropland against grassland—I could show a greater net income from my grassland than I have indicated. I also have the deep satisfaction of knowing that my soil is staying on the hills where it will continue to produce. I'm seriously considering converting more of my acreage to grassland."

REVIEWS

THE STORY OF FAO. By Gove Hambidge. 303 pp. Illustrated. 1955. New York: D. Nostrand Company.

ANYONE familiar with the several books authored by Gove Hambidge, or the long list of Agricultural Yearbooks which he edited, would expect a discriminating job on "The Story of FAO." That is precisely what you find in this 300 page book.

Officially, FAO had its inception in Quebec in October 1954, yet the real surge for such an organization started with the Conference on Food and Agriculture in Hot Springs, Va., 2 years earlier, and in the midst of the war, when representatives from 43 nations were assembled.

Hambidge attended the Hot Springs conference and later became Executive Secretary of the Interim Commission that had the responsibility of drafting the FAO constitution. He has been with FAO continuously since that time and he is now the North American Regional Representative.

In the early chapters we get a closeup view of the work of the bushy-eyed, capable but disarmingly frank Britisher, Sir John Orr, the Director-General. Later we learn how our own Norris E. Dodd shouldered the burdens of the international office until he was relieved a little more than a year ago by our Dr. P. V. Cardon.

Nowhere, perhaps, can we find a better account of the administration of FAO, but that is not the emphasis in this book. FAO is a human story and Hambidge has succeeded in making it just that—human.

The first chapter takes you to Egypt. Here you go into the villages, the homes, and the fields of the Egyptian peasants. They have a half acre of so of land each, and the equipment and methods in use are much the same as those in use hundreds and even thousands of years previously.

This grim Egyptian story is built around the fictional character, Abu Libda, and his family. In contrast, you are quietly shifted to an Iowa

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farm and the story here is about the fictional character of Jim Barton and his family, who live on a corn-hog-dairy farm in our fertile midland. Here is sketched the whole background of the development of modern American agriculture, hand in hand with industry.

In many countries and in many instances we are given a faithful picture of land misuse or land abuse, and related poverty and hunger, yet with all this Hambidge sounds a hopeful note. We quote:

"For instance, there is the rice breeding and other work in the Far East, in which many countries are getting together for the first time in history on projects of enormous potential benefit. There is the fight against desert locusts in the Middle East, where as a result of cooperative work the outlook for licking this terrible scourge is more hopeful than it has been since the days of the Pharoahs. There is the campaign against rinderpest, the major animal disease throughout the Far East, a killer at least as deadly as the foot-and-mouth disease with which we are familiar in our part of the world. All of this regional work is a natural for an international organization like FAO, and I think we have done major pioneering in that field. It is interesting that the U. S., according to recently announced plans, is going to emphasize the regional approach in its own bilateral programs.

"We are also carrying out projects and programs in some 50-odd individual countries, using teams of experts which in turn are drawn from over 50 countries—quite a few from the U. S., but also from nearly everywhere else where there are good technical workers. There is great variety in this work . . . for example, equipping fishermen's boats in Ceylon with motors for the first time, enabling them to double or triple or quadruple their catch . . . improving the skinning of animals in India and the tanning of hides and making of leather which brings a very considerably increased income to a lot of humble folk . . . improvements in the processing and packaging of dates in Iraq, which has meant a sizeable investment by the Iraqi date industry in U. S. equipment."

Credit is given for the work done by other agencies in government, as well as by churches, universities, and foundations which stretch back over many years. Those of us who contribute to foreign missions, or those of us who refuse to contribute to the work of the missions, will find his comments on this subject of considerable interest.

GLENN K. RULE

LEST WE FORGET.—Over the years I think many of us have been lulled into somewhat a false sense of security so far as soil erosion is concerned, due principally to the lack of rain. Because we did not observe much erosion in the open fields, I suppose we felt that everything was under control.

Rains have now pointed out the fact that our number of basic plans is inadequate, and that the open or cultivated land has not received its full share of attention. With a normal season of rainfall the amount of erosion is still alarming.

I think we have done a very good overall job on conservation engineering, woodland management, and pasture work, but we do need to accelerate the basic plans, particularly on open or cultivated land.

Good basic plans have been our main weapon against soil erosion. They still are. I think we should recognize this and be guided accordingly, with special attention to the needed treatment of open fields. We should remember that the movement of soil takes place on all sloping land—and sometimes on level land. And we should see that provisions are made in our planning to keep this soil in place with such practices, or combinations of practices on contour cultivation, stripcropping, terraces, rotations, crop residue management, and so on; and wherever water materially concentrates provisions such as grassed waterways should also be included. I don't think there is any substitute for this way of doing our conservation job.

—W. A. PHILLIPS

(Adapted from a letter written by Mr. Phillips, as Area Conservationist, to work unit personnel in his area of Virginia.)

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

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OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE, U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

WELLINGTON BRINK
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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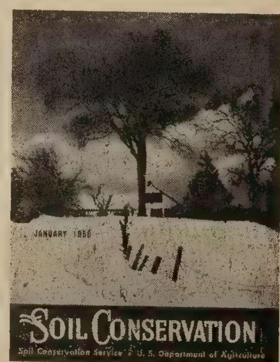
TIMBER SURVEY.—The Nation's timber requirements are expected to be so high by the end of the century that timber growth will need to be from 70 to 120 percent greater than now.

Improved forest management at recent rates of progress appears unequal to providing a balance between cut and growth at the year 2000. This means that further acceleration in forest management and production on both public and private lands must be attained if anticipated demands are to be met.

These basic findings are in the preliminary Timber Resource Review. This report represents the most complete survey of timber resources ever made, and required over 3 years in planning and field survey. It was made by the USDA's Forest Service in cooperation with State Foresters, other State agencies, forest industries, and other public and private organizations.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—The chill beauty of February settles on this farm house in Coos County, N. H.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The Editor Makes a Final Report

Here are cited a few of the things this magazine has tried to do in two busy decades under a single editorial direction.

IT is 20 years and 6 months since I brought out the first issue of SOIL CONSERVATION Magazine in August 1935.

They have been eventful, exciting, incredible years.

My Editor's post has afforded an unusual vantage point from which to view the National scene. Within this journal's pages has been captured something of the pulsation of our times, as our land has known depression, drought and dust bowl, flood and hurricane, war and threats of war, and also the blessings of prosperity.

Here in our magazine's lengthening files is perhaps the only complete and coherent history of the modern movement to conserve our soil and water. Here, too, is the story of a great people—stewards of the land—moving together toward high destiny through their own unique soil conservation districts.

This periodical has functioned as the voice—the "official organ"—of the Soil Conservation Service. It has endeavored to speak authoritatively, clearly, and with scientific accuracy. At the same time, it has sought to be readable and stimulating.

The magazine has been able to attract the work of many of the best writers in the broad field of conservation. Its constant aim has been to serve the whole dynamic ecological objective.

I am immeasurably grateful for the extraordinary support I have had as Editor from the Service, from our readers, and from our contributors.

By latest count, there have been 246 monthly issues, approximately 6,000 illustrations, and something like 1,000 authors, many of whom have by-lined a number of articles each.

In thoughtful retrospect, it would seem that our writers have had a great deal to do with reshaping the American concept of proper land use, with remodeling the public's conservation thinking, and with seeding ideas that have taken vigorous root in this country and abroad.

I have a notion that the magazine's scheme of distribution has aided its effectiveness. The press run has never been very large—usually about 6,500 free copies and 3,500 paid subscriptions. With few exceptions, each of the free copies has gone to a hand-picked destination where it has been read by an entire staff rather than a single individual. Thus, our journal has been able to reach a surprising number of specialists on college and government payrolls, as well as a considerable army of students, teachers, textbook writers, editors, and administrators. Its circulation reaches around the world. Much of its material has been picked up and reprinted and its impact thus has been magnified. Many libraries are in the habit of binding the volumes permanently. Out of the

magazine have developed whole books or parts of books. Excellent photographs, selected from a large flow from "the field," have become a tradition.

All of us who have had a hand in making SOIL CONSERVATION Magazine have been pleased to note the high quality of writing. Another point of gratification has been our occasional discovery of a celebrity before he has attained wide acclaim. Kenneth Davis wrote for us as early as 1936, then established himself as a novelist. Dr. Selman A. Waksman contributed "The Living Soil" and "Humus and Soil Conservation" — remember? — and later became world famous for his work in antibiotics. Dr. Paul S. Sears, a veteran in our columns, will soon take office as president of the American Association for the Advancement of Science. Dr. W. C. Lowdermilk, an oldtime member of our group, now is an international conservation authority and an author and lecturer of note. Then, of course, there is the "father of soil conservation," Hugh H. Bennett himself—for so long a regular contributor.

These are but a few of the magic names. It has often remained, however, for some young or little known technician to come up with a particularly noteworthy manuscript.

Sprinkled through the twenty-plus volumes are sparkling gems—perhaps a hundred—that deserve special recognition. All of us have our favorites. Each carries its own particular charm. I think of three which will do as samples—

"Kudzu is This Farmer's Friend" by the late E. M. Rowalt. A verbatim report of the experience of a Southern Negro in feeding his old mule.

"Woodland Caribou in Minnesota" by William T. Cox. An adventure in combatting the extinction of a wildlife species.

"The Death of a Great City" by M. L. Kirschner and Malcolm Orchard. A dramatic recital, with lesson appended, from New Delhi, India.

The war generated many a mellifluous slogan. Who could ever forget "Selective service for every acre" . . . "The flag is on the plow" . . . "Acres are aces."

Peace brought an almost equal crispness of phrase and title. How intriguing, for example, "The Hills are Falling Down"—the tag on an article about the Palouse country!

In 1935 SOIL CONSERVATION Magazine was something of a pioneer. It is credited with having been the first periodical in the world entirely devoted to the conservation of soil and water. Now, happily, it has been joined by a numerous family of top-notch contemporaries launched by the States, by other countries, and by various organizations that have come into the conservation field.

But there is always pioneering to do. And our magazine under a new Editor will find fresh trails to blaze, new horizons to explore, and can be depended on to improve the value of its service month by month and year by year. I am so confident of this that I am happy to write a newsman's "thirty" now to this phase of my own career.

Soon I shall be on my way to Thailand for the International Cooperation Administration. There I shall be doing what I can to help that Nation develop its agricultural extension information program.

Thanks for everything—and best wishes to my successor and those who will be working with him in the years to come!

—WELLINGTON BRINK

——30——

Water Laws

BETWEEN January and July of 1955, 20 States passed new legislation, or amended existing legislation, to further cooperation between local agencies and the Secretary of Agriculture in carrying out the provisions of Public Law 566, the Watershed Protection and Flood Prevention Act of 1954.

The States passed 37 different laws during the 7-month period. Most of them were designed to meet the requirements of the new

Note.—This summary is based on a study made by Kirk M. Sandals, of the Soil Conservation Service, and L. M. Adams, of the Office of the General Counsel, U. S. Department of Agriculture.

federal policy by authorizing local agencies to carry out, maintain, and operate watershed works of improvement.

Local agencies defined in the federal law may be States, political subdivisions of States, such as counties, towns, townships and boroughs, soil conservation, watershed, flood prevention or drainage districts, and similar agencies.

Eight States passed legislation pertaining to State agencies. California authorized the State Water Resources Board to pay for the cost of lands, rights-of-way, and easements. Vermont authorized the State Water Conservation Board to build, operate, and maintain structures. New Hampshire appropriated funds to the Water Resources Board to assist in carrying out watershed projects.

Kansas and Minnesota established a Water Resources Board, and North Carolina created a Board of Water Commissioners. Oklahoma set up a study committee on water problems, and Wisconsin authorized a study of watershed management by the Joint Legislative Council.

Four States passed legislation pertaining to State political subdivisions. Connecticut authorized cities, towns, and boroughs to cooperate with the Federal Government in watershed projects. Nebraska gave certain counties the right to appropriate funds for and to carry out flood control projects. Maryland authorized Worcester County to undertake works of improvement provided for in Public Law 566. Wisconsin authorized counties and towns to assist in developing watershed projects, and empowered towns to furnish financial assistance to soil conservation districts.

Thirteen States passed legislation that gives additional authorities to soil conservation districts. California authorized formation of improvement districts within soil conservation districts. Colorado gave soil conservation districts the authority to levy taxes or assessments for watershed improvement or flood prevention. Illinois and Iowa authorized creation of subdistricts within soil conservation districts. Oklahoma gave soil conservation districts the power of eminent domain in acquiring lands needed for upstream flood control.

Eight other States, Kansas, Minnesota, Nevada, New Hampshire, Tennessee, Vermont, Wisconsin, and Wyoming, broadened the powers of soil conservation districts to act as local agencies under the provisions of Public Law 566.

Five States passed legislation pertaining to watershed districts. Minnesota and Tennessee authorized creation of watershed districts, and Nevada authorized formation of watershed protection and flood prevention districts. Kansas and Nebraska amended existing watershed districts laws.

Five States passed legislation pertaining to other kinds of districts. Connecticut amended laws relating to flood control and shore erosion to provide for organization of flood and erosion control districts. Delaware and Mississippi amended drainage laws to give drainage districts authority to carry out flood prevention projects. Wyoming authorized creation of flood control districts. Texas created three new districts, the York Improvement District, the Atacoosa and Frio Counties Improvement District, and the Trinity River Authority.

Many of the 28 States that did not pass legislation in 1955 are studying existing laws to determine whether additional legislation should be considered during the 1956 and 1957 legislative sessions.

DISTRICT PROFILE

BELLE BURCHELL of Massachusetts

BELLE BURCHELL used to attend meetings of the Nantucket (Mass.) Soil Conservation District board of supervisors because she wanted to. Now she also attends because she "has" to. She's secretary of the board. She's one of a score of women included in the 13,000 supervisors who rule the nation's soil conservation districts.

Belle (Mrs. Gilbert E.) Burchell has been interested in farming since she was a girl on her parents' Cape Breton, Nova Scotia, farm. When she moved to Nantucket, that peaceful little island south of Cape Cod, her interest continued.

The Nantucket Soil Conservation District, formed in 1949, was the first farm body on the

Belle Burchell.

island and is still the only one. Supervisors' meetings therefore became an agricultural town meeting. Authorities on various farming subjects were brought in from the mainland as speakers.

The meetings were more than sessions devoted to routine business. Many farmers came not only to learn how the affairs of their district were being run but also to increase their knowledge of farming by listening to the imported specialists. Many other islanders not directly engaged in farming came to "keep up" on agriculture—including Mrs. Burchell. In the back of her mind was the thought that some day she would farm.

Then came election to fill a vacancy on the board of supervisors. Belle Burchell won without a contest, and was quickly selected as secretary.

Mrs. Burchell brought to the board that smooth efficiency that sometimes only a woman can attain. Her minutes are precise, her records always in order. She helps keep business moving along. Her sense of humor is lively.

Mrs. Burchell looks forward to getting into farming on her own. A few years ago her sister, Mrs. Barbara MacLean, bought a 45-acre place on Nantucket. She signed an agreement with the district to apply all the conservation measures needed to improve the land and protect it from erosion. Now she is waiting for Mrs. Burchell and her husband, a professional fisherman, to join her in operating the place. They plan to grow fruit, berries, sweet corn, early potatoes, and peas.

"The summer residents are glad to pay a premium for garden-fresh fruits and vegetables," Mrs. Burchell says. "I'd like to grow things for them. One of these days my husband will tire of the sea. Then we'll all settle down to farming. That will be a happy day for all of us."

—Lester Fox

A Nursery Saves Soil and Labor

By C. EDMUND ANDERSON

THE pioneer nursery in Nebraska was also a pioneer in the field of soil and moisture conservation.

Marshall's Nursery is located in the town of Arlington. It was conservation minded from the beginning. Each spring surplus bundles of nursery stock were used as gully checks. Terraces shaped like half moons, made with a walking plow and horse, were built on the downhill side of each tree in the orchards to collect water and stop erosion. The ends of these terraces overlapped so that a rather effective job was done. Tillage implements were raised when small gullies were crossed.

Note.—The author is work unit conservationist, Soil Conservation Service, Blair, Nebr.

This lath house has 75,000 coniferous plantings.

How they got started on a complete soil and moisture conservation program can best be told by Vernon Marshall, vice president, and Keith Meier, general production foreman.

"Our 95-acre apple orchard which had just reached full production, was destroyed in one night by one of the most severe storms ever to hit this area. The fall of 1940 had been mild. On the eve of November 10, it began to rain. By midnight the wind changed to the north and on the next day the temperature was well below zero. We knew that the damage to our fruit trees would be terrific but it was not until the next spring that we realized that all the trees were either dead or would die. It was while making the tree survey the following spring that we saw the terrific soil loss that had been going on and knew immediately if the orchard was to be replanted a soil and moisture conservation program would have to be installed.

Thus it was that Marshall's Nursery started a program of soil and moisture conservation on 330 acres of farmland and 200 acres of nursery stock.

Vernon Marshall contacted the Soil Conservation Service and asked assistance. The first problem was the removal of thousands of dead apple trees. In the fall of 1942 the first terrace lines were laid out. In the old orchard there had been an irrigation well. Now there was no need for its services, but the terrace lines were laid so that the new orchard could be irrigated. Forty-two acres of the old orchard were terraced and replanted, the remainder being set aside for cultivated crops.

Difficult as was the removal of 95 acres of dead trees and the leveling and terracing of the land, it was nothing as compared to installing a conservation program on 200 acres of living nursery stock. The trees varied from 3 to 15 years old, and they were set in square plantings of 150 square feet each. The first terraces were built in 1944 in a small field as sort of a trial run. The advantages of this type of planting were noticeable immediately. According to Keith Meier: "There was no soil loss during heavy rains and the planting scheme saved labor. The terrace channels were used

Meier inspecting growth on one of the plots.

as roads and in loading it was necessary to carry the trees only half as far as had been necessary with the old block planting method." Thus in the next 10 years, 200 acres of block planted trees were converted into contour plantings.

The soil loss from a nursery is great although there may be no erosion, says Meier. The balling and moving of thousands of trees each year removes tons of soil. Consequently, says Meier: "We must carry out a good crop rotation that will keep up our soil fertility." The primary rotation used between plantings of nursery stock is 1 year of small grain followed by 2 years of meadow. Soybeans are also used as green manure crop.

The land used for the production of grain and hay also has a complete conservation program.

A conservation program also is being installed on an additional tract of 240 acres which was rented recently.

Conservation is a must on this rolling land and the Armistice Day storm of 1940 may have been a blessing in disguise, Meier thinks, for it made necessary an improvement in soil management and made possible a saving in labor.

Soybeans are an important crop in the rotation.

A message from an old hand in the Soil Conservation Service.

Farm Wood Crops

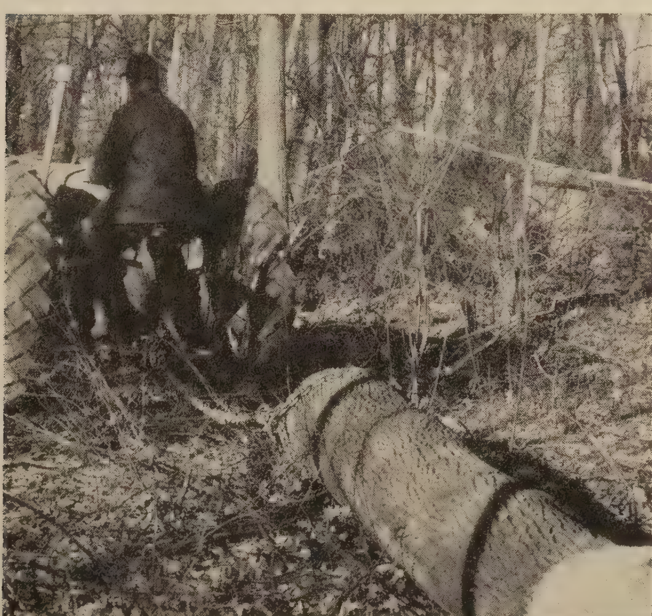
By JOHN F. PRESTON

VERY shortly now 10 years will have passed since I retired from the Soil Conservation Service. Retirement, I find, makes one a little more tolerant and perhaps gives a better perspective of some of the problems and some of the opportunities. I want to talk to the Soil Conservation Service about an opportunity for service.

Farm planning in the Soil Conservation Service includes the woodland, but there are many difficulties in getting farmers to accept wood as a farm crop. Hence the progress is very slow. The Service is struggling with the same obstacle that has beset the farm forestry program from the beginning. This is the fact that agriculture does not recognize wood as a farm crop or even growing it as a farm activity; and farmers, like people in other activities, fol-

Small saw mill at work in Maryland.

Woodland management cutting on a Delaware farm.



Snaking a log out of the woods to where it can be picked up by a truck.

Note.—The author was chief, forestry division, Soil Conservation Service, Washington, D. C.

Black oak log measuring 21 inches in diameter, on farm near Springfield, Ohio. Trees protect the land from erosion and produce a valuable crop.

low the precepts of agricultural teaching. There is no proper foundation for a "farm forestry" program and until one is built, the farm planners like the forests who have struggled independently for 50 years, will also fail.

The real problem is to get wood accepted as a farm crop, and growing it accepted as a farm activity.

"The basic truth that farm forests can be managed and wood grown as a farm crop, thus enabling the nonarable land to assist the arable land to produce a farm income, has never been fully grasped in all the history of American agriculture." [1]

Ah! there is the rub. Wood is not a farm crop. Farmers do not so consider it. Schools of agriculture do not teach that it is. Agronomists, engineers, and other technicians made

[1] From Developing Farm Woodland. By John F. Preston, 1954. McGraw-Hill Book Co., New York. N. Y.

into farm planners do not get this idea across to the farmers, and many foresters are still foggy about it. They are too apt to think in terms of commercial forestry, meaning stumpage sales at 10-, 15- or 20-year intervals.

Now let's see what is actually meant by wood as a farm crop. In my opinion here it is in four categories, and very simple.

1. The farmer must become the manager of his woods. He may seek advice and technical help from others but he remains the manager of his own woods.

2. He must cut and sell processed products. This gets away from stumpage sales, which must be the exception rather than the rule.

3. He must cut wood products every year. Not always saw logs but the habit of annual cutting keeps familiarity with the woods and gives the needed experience.

4. He must use farm labor insofar as possible for woods work.

This is what I think we mean by "wood as a farm crop." It is more of a creed, a concept, an idea, than it is a forestry program. Even if the farmer knows little or nothing about silviculture and follows those four rules he will not go far wrong. He is bound to get interested, and he will seek and find the technical advice that he needs to make a success of his woods work. If the rules are followed, wood will automatically become a farm crop.

The Soil Conservation Service prides itself upon the unity approach to the farm problem. The farm is the unit, and a corollary of that is that all farm acres should contribute to farm income. Yet how often in the past, in planning farm conservation programs where the woodlands constitute an appreciable part of the farm, do we forget that simple truth. The opportunity of the Soil Conservation Service with its program for farms as units is to get wood included as an agricultural crop. If the concept of wood as a farm crop can become established in agricultural teaching and agricultural lore, the technical part of the job would be quite easy.

This, then, is the opportunity of the Soil Conservation Service: to render a service to farm-

(Continued on page 140)

Salem Pilot Watershed

By JOHN GRANT

NOW there will be fewer wasteful flash floods and recurring droughts to harass the city of Salem, W. Va., its business places, homes, and farmland. Their conquest constitutes one of America's best success stories in dealing with upstream watersheds.

There are three basic reasons for the steady progress in the Salem pilot watershed project:

1. The local will and know-how to defeat the problems of flood and drought.

2. The size of the 5,325-acre watershed, which has permitted a high degree of upstream flood prevention at small cost.

3. The partnership between local, State, and Federal agencies on watershed problems.

Long before Congress appropriated $5 million for the pilot watershed program in 1953, Salem residents had been girding for battle with the ugly forces of nature on a rampage. The largest flood on record damaged 73 urban houses and 61 business places at a cost of about $233,000 in 1950. This came shortly after the second worst flood in 1947. Minor inundations resulting from intense rainfall caused some damage every year, arriving on short notice and frequently in the summer.

Even worse than flooding has been the loss of an estimated 23,000 tons of soil material each year since the land was first cleared some time before the Civil War. In addition, a shortage of water has been an acute problem for the city for many years. Water demand has been increasing beyond the capacity of deep wells to supply emergency needs through recharge by the relatively impermeable residual soils. The last three drought years in 1951, 1952, and 1953 made it necessary to curtail water use sharply.

Note.—The author is manager of the Upper Monongahela Valley Association, a 10-county watershed development organization in Northern West Virginia, Peoples Building, Fairmont, W. Va.

(Continued on page 138)

Use of Herbicides in Conservation

By W. C. SHAW and Marion W. PARKER

WEEDS are pests that most farmers cannot afford. The losses caused by weeds on farms in the United States have now reached an estimated 4 billion dollars annually. These losses are estimated to be second only to farm losses caused by soil erosion.

Weeds compete with crops for water, light, and mineral nutrient. They increase the cost of labor and equipment, reduce the quality and quantity of farm and livestock products, harbor insects and diseases, and impair the health of livestock and humans. Some weeds are especially competitive. The average ragweed plant has a water requirement three times that of corn. One plant of common mustard requires twice as much nitrogen, twice as much phosphorus, four times as much potash, and four times as much water as a well-developed oat plant.

Note.—Both authors are of the Agricultural Research Service, Beltsville, Md.

Economical, practical, and effective weed control is essentially a part of planned soil and water conservation and a necessary requirement for successful farming.

An important objective of the research program of the Department of Agriculture is to develop weed control principles and practices that will result in reducing the losses caused by weeds.

Weed investigations include studies on cultural, ecological, chemical, mechanical, and biological methods of control. There are four broad general areas of work: (1) Research on the evaluation of chemicals for their herbicidal

Figure 1.—Left, no cultivation, weeds controlled by chemicals. Right, weeds controlled by cultivations, but potatoes less vigorous due to root and soil damage from excessive cultivation.

Figure 2.—Left, a pre-emergence treatment of TCA and endothal controlled weeds for 6 weeks, greatly reducing cultivation needed. Right, heavy infestation of weeds in untreated check.

No. 11

This is the eleventh of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

properties, including studies of factors affecting the efficiency of chemicals as herbicides; (2) physiological and ecological studies on weeds and crops in relation to methods of weed control; (3) research on weed control in cultivated crops, including field and horticultural crops on nonirrigated and irrigated lands; and (4) research on weed control in pastures and on rangelands and noncultivated areas. This research is being conducted at 29 locations in cooperation with the Soil Conservation Service, Forest Service, Department of Interior, and 23 State Agricultural Experiment Stations.

In the past decade there have been many significant developments in the control of weeds by chemicals. Some of those most closely related to soil and water conservation include: (1) Reduced tillage in those crops for which satisfactory chemical weed control practices have been developed; (2) chemical treatments as pasture renovation aids; (3) chemical control of brush and weeds as a means of increasing the productivity of pastures and rangelands; and (4) the conservation of water through the efficient control of weeds in irrigation channels and drainage ditches and on ditchbanks.

How does the use of herbicides aid in soil conservation? A 3-year cooperative investigation on cultivation and weed control practices in potatoes conducted by R. J. Aldrich, field crops research branch, Agricultural Research Service, U. S. Department of Agriculture, and G. R. Blake and J. C. Campbell of the New Jersey Agricultural Experiment Station help supply some of the answers.

Potatoes are intensively tilled in the Eastern United States. Tractors and other equipment are used from March to October. During that time the soil may be plowed and harrowed several times before planting. After planting,

Figure 3.—Left, untreated. Right, a pre-emergence application of an ester of 2,4-D at 2 pounds acid equivalent per acre gave excellent weed control and eliminated the need for the first two cultivations. These and other studies indicate that effective chemical weed control can greatly reduce the amount of cultivation required for maximum corn yields.

ridges are harrowed off, potatoes are cultivated 4 to 8 times, sidedressed, sprayed 5 to 9 times, and sometimes chiseled. Vines are killed by spraying or beating, potatoes are dug and hauled. Finally the field is disked and planted to a cover or other crop. These operations result in about 20 to 25 miles of travel on each acre in a season. This is intensive farming.

The use of herbicides makes it possible to reduce this traffic by reducing the amount of cultivation needed to control weeds.

In the research studies, the yield of potatoes varied with the number of cultivations and the extent of damage to soil and crop from excessive cultivation. The results indicated that when herbicides were used to control weeds not more than two cultivations were required for maximum yields. Yields were actually lowered by excessive cultivation in 2 out of 3 years. In these studies the herbicide DNBP (4, 6-dinitro ortho secondary butyl phenol) as a pre-emergence spray controlled the weeds for 4 to 6 weeks after potato emergence, eliminating the need for cultivation during this period.

Any traffic or machinery on soil tends to compact it. This is also true of cultivators. Although the cultivator loosens the surface soil, that in the root zone is actually compacted by the machinery. During the 3 years of this study, soils that were cultivated once had an average weight of 95 pounds per cubic foot, whereas those cultivated 5 to 7 times weighed 98 pounds. One hundred thirty thousand extra pounds of soil were packed into the surface foot of each acre.

It is not merely the packing of soils that is detrimental to plants growing in them. Other effects accompany the compaction. Air space, for example, is reduced. The part of the soil filled with air is a measure of aeration. It is the space through which plant roots get oxygen from the atmosphere and through which carbon dioxide filters out of the soil. Five to seven cultivations reduced the soil air space by 15 percent in the 2 years of measurements.

Compacting wet soils also crushes and destroys soil granules or aggregates of particles. When these are destroyed there is increased tendency toward muddiness of the soil when wet, and crusting and cloddiness when dry. Aggregation tests on many samples showed that minimum cultivation left the soil in better tilth.

It should be pointed out that wet soil is compacted much more easily and to a greater degree than dry. Most potato cultivation normally is done in early spring when soils are relatively wet. Pre-emergence spraying with chemicals not only saves labor and cost of cultivating but makes it possible to stay off the land for 5 to 6 weeks after application. This is precisely the time when greatest damage usually occurs from cultivation. The cultivations that were found necessary were needed later in the growing season when the soil was usually drier.

Figure 4.—Left, untreated oats heavily infested with mustard. Right, an amine salt of 2,4-D at one-fourth pound acid equivalent per acre has given excellent control of mustard. The per acre cost of the herbicide for this treatment was 25 cents.

Figure 5.—A low volatile ester of 2,4,5-T being applied for the control of weeds and woody plants on an irrigation ditchbank.

It is believed that the reduced potato yields which resulted from 5 to 7 cultivations were a direct result of damage to the soil structure and to potato roots. The damage to soils is not corrected simply by plowing the next year. It is cumulative. Loss of soil productivity by damaged soil structure is corrected slowly and only with the greatest care in applying good soil management practices such as rotations, cover crops, and proper tillage.

This is but one striking example of the relationship between chemical weed control, good soil management, and soil conservation. The use of preplanting and pre-emergence herbicides for the control of weeds is also making it possible to plant and grow corn, sugar beets, and other crops with less seedbed preparation and with fewer early cultivations.

The increased effectiveness and lower cost of some of the newer herbicides have resulted in the development of a new principle in pasture renovation. Low rates of sodium trichloroacetate (TCA), sodium 2,2-dichloropropionate (dalapon) and 3-amino-1,2,4-triazole and various mixtures of these herbicides with 2,4-D may be used to kill old Kentucky bluegrass sods and other undesirable sods and plants, on soils where tillage operations are ineffective, or where critical slopes increase the hazards of soil erosion if effective seedbed preparation by tillage is practiced.

The effective use of herbicides to assist pasture renovation makes it possible to replace unproductive or undesirable sods on steep slopes and on stony soils that cannot be renovated by conventional tillage equipment or seedbed preparation techniques. In recent research studies when herbicides were used to kill existing sods, only two diskings for seedbed preparation were required to give highly successful stands of a Ladino clover-orchardgrass mixture, alfalfa, birdsfoot trefoil, and other forage species. When herbicides were not used as renovation aids, 10 to 12 diskings were required for seedbed preparation that gave equally satisfactory forage stands.

Millions of acres of rangelands are being invaded by mesquite, sagebrush, sand sagebrush, shinnery oak, juniper, rabbit brush and other weedy range plants. Herbicides are being used on over 2¼ million acres of pastures and rangelands for the control of weeds and brush. Results of recent studies indicate that effective chemical control of weeds and brush on much of our rangeland would increase the production of desirable forage species 40 to 80 percent. Much additional research is needed to develop control practices for some of these species.

With increased research and the continuous development of more effective herbicides, there will be more opportunities for reclaiming these weedy areas and increasing the productivity of weed and brush-infested rangeland.

Most weeds normally use larger quantities of water in their growth processes than do most cultivated plants. This water is not available for use by economic crop plants and thus there is a serious loss in agricultural production. Weeds in irrigation canals and drainage ditches of the Bureau of Reclamation's 14,075 miles of irrigation systems are estimated to result in a loss of more than 150,000 acre-feet of water each year. Add to this amount another 60,000 acre-feet of water lost annually due to salt cedar and other weed infestations along other irrigation sources such as rivers and reservoirs, and the total value of the water loss probably exceeds 3 million dollars annually.

Project these water losses to all irrigation systems in the western region involving approximately 120,386 miles of unlined canals, and the estimate of annual water loss due to weeds exceeds 1¼ million acre-feet with an annual gross value of nearly 25½ million dollars.

In cooperative research with the bureau of Reclamation, the Agricultural Research Service has developed chemical weed control practices which will aid in reducing the water losses caused by weeds and the cost on controlling weeds.

The use of aromatic solvents and other chemicals for the control of submerged water weeds in irrigation canals in the West is rapidly being accepted as necessary for proper management. Recent research has shown that several new chemicals, including 2,2-dichloropropionic acid and 3-amino-1,2,4-triazole, may prove more effective for the control of cattails, phragmites, and other ditchbank weeds than some of the present treatments.

Farmers have demonstrated outstanding interest in the use of chemicals to control weeds. Herbicides are being applied on an average of 1 out of every 10 acres of cultivated land in the United States. It is estimated that over 85 million pounds of herbicides were used for weed control on agricultural and nonagricultural lands in this country in 1952. Of the total acreage sprayed and dusted for weed, insect, and disease control, more than half was sprayed for weed and brush control. In 1952, a total of 33.5 million acres of agricultural lands were sprayed for weed control, as compared with a combined total of about 29 million acres sprayed or dusted for insect and disease control. The total sprayed for weed control included approximately 18 million acres of small grains (wheat, oats, rye, barley, flax, and rice), 9.5 million acres of corn, 2.5 million acres of pasture and rangeland, and over 2.5 million acres of other crops.

About 70 percent of the acreage sprayed for weed control was treated by farmers using their own equipment. The cost of chemicals on this acreage amounted to about 26 million dollars. On the remaining 30 percent of the total acreage, custom operators furnished and applied the herbicides at a cost of 22 million dollars. Thus, in 1952, American farmers were paying a total of 48 million dollars annually for the control of weeds on their farms. This gives some indication of the use of chemicals and the cost of weed control on agricultural lands. The use of chemicals on nonagricultural lands such as rights-of-way of highways, utility lines, railroads, and industrial and military sites is also a constantly increasing practice.

PUBLIC SERVICE PROGRAM.—Vermont's television station WCAX–TV, operating on Channel 3, with service including neighboring New York, New Hampshire, and Canada, devotes attention to soil conservation regularly as an important part of the agricultural program "Across the Fence." Kenneth Wilson, Vermont state soil conservation engineer, is seen here demonstrating the use of tile in soil drainage while Lloyd Williams, master of ceremonies, looks on. "Across the Fence" is presented as a public service daily at noon, Monday through Friday, with the cooperation of the University of Vermont College of Agriculture and the Vermont Extension Service.

Advisory Committee

MEMBERS of the Soil and Water Conservation Advisory Committee of the Department of Agriculture held their first meeting in Washington October 27 and 28 with representatives of the Secretary's office and Departmental agencies dealing with conservation activities. Assistant Secretary Ervin L. Peterson was chairman.

Seventeen of the eighteen members appointed by Secretary Ezra Taft Benson participated in the sessions.

Committee members were briefed by G. W. Irving, deputy administrator, and Sherman E. Johnson, director of farm and land management research, Agricultural Research Service; Clarence M. Ferguson, administrator, Federal Extension Service; Donald A. Williams, administrator, Soil Conservation Service; Richard E. McArdle, chief, Forest Service; Fred G. Ritchie, acting administrator, Agricultural Conservation Program Service; and Homer D. Cogdell, assistant administrator, Farmers Home Administration.

The committee recommended that the Department seek an amendment to the Watershed Protection and Flood Prevention Act, Public Law 566, that would provide for federal participation in the cost of structures designed to store water for purposes other than flood prevention. The act limits federal cost-sharing to structures designed for flood prevention only.

Assistant Secretary Peterson said the committee would function on a continuing basis, that it would meet on call at least once yearly, that 6 members would serve for 1 year, 6 for 2 years, and the remaining 6 for 3 years.

Membership will be rotated on a geographic basis, he said, so that the original structure of the committee—6 each from the West, Central States, and East—will be maintained and the turnover will be only 2 members annually from each geographic area. The Assistant Secretary indicated that subcommittees could be appointed to make special studies, as the need arises, and report to the entire committee.

Soil and Water Conservation Advisory Committee

Leo L. Anderson, director, Sexauer Seed Co., Fargo, N. Dak.

Earl T. Bower, Wyoming Water Resources Board, Worland, Wyo.

R. Edward Baur, director, National Association of Soil Conservation Districts, Van Meter, Iowa.

Dr. Firman E. Bear, chairman emeritus, Department of Soils, Rutgers University, New Brunswick, N. J.

George D. Clyde, Commissioner of Interstate Streams, Utah Water and Power Board, Salt Lake City, Utah.

Bill Durham, farm editor, Fort Worth Star Telegram, Fort Worth, Tex.

Charles J. Elliott, director, Illinois Agriculture Association, Streator, Ill.

L. W. Garver, chairman, Soil and Water Conservation Committee, Farm Equipment Institute, Racine, Wis.

L. Roy Hawes, Commissioner of Agriculture, Commonwealth of Massachusetts, Sudbury, Mass.

T. R. Hedges, former chairman, Washington Association of Soil Conservation Districts, Waterville, Wash.

Tom Hitch, president, Tennessee Farm Bureau Federation, Columbia, Tenn.

A. D. Holmes, Jr., area vice president, National Association of Soil Conservation Districts, Gallion, Ala.

Mrs. Katherine Jackson Lee, chairman, New Hampshire Natural Resources Council, Peterborough, N. H.

L. L. Males, secretary-treasurer, Washita Valley Flood Control Council, Cheyenne, Okla.

Raymond A. McConnell, editor, Nebraska State Journal, Lincoln, Nebr.

Wade Newbegin, president, R. M. Wade & Co., Portland, Oreg.

William Rosecrans, chairman, California Board of Forestry, Los Angeles, Calif.

Carl Shoemaker, conservation consultant, National Wildlife Federation, Washington, D. C.

SALEM PILOT WATERSHED

(Continued from page 131)

To correct these difficulties, local leaders had hoped to build many farm ponds to provide some measure of flood control but in this they were disappointed. They also had obtained an estimate of about $700,000 for comprehensive channel improvement within the city limits on Salem Fork of Tenmile Creek and Jacob's Run. This was the creek they already had cleaned out once since 1936. After the June 1950 disaster, a spontaneous drive started in Salem and neighboring Bristol, just downstream, and a sum of about $13,000 was raised in 1952. With power shovel and bulldozers, the channel was deepened and widened from below the watershed area through the town to its upper limits.

Shortly afterward the City Council became interested in the possibility of a city reservoir to correct the inadequate well supply, and initial surveys of sites were undertaken in early 1953. More detailed surveys of the most promising reservoir site just up Dog Run, a short distance above the city filtration plant, were undertaken and some of the land was placed under option by the city. The watershed progress to that time, while not rounded out, was sufficient in 1953 to cause the conservation committees of the Upper Monongahela Valley Association and the local soil conservation districts to hold a regional meeting with a tour to publicize the

Board of Directors, Upper Tenmile Watershed Association, Inc.: Seated—State Senator Walter A. Holden, Kenneth Summers, Secretary Edwin J. Bond, President Herschel D. Wade, Treasurer David L. Nicholson; standing—Vice President Glenn L. Post, and Harley D. Bond.

Problem area: The Salem Fork of Tenmile Creek where Jacob's Run comes under the buildings of Salem, the highway, and the railroad to join it. Before the stream-cleaning in 1952 the channel became blocked with silt and debris to large extent aggravating the flood problem.

accomplishments. The previous accomplishments, the record of developed leadership, Salem's location on Route 50, and the small size of the watershed were responsible for the selection of the Salem area as West Virginia's first and only pilot watershed later that year. Just previously, Congress has passed a $5 million appropriation to start a watershed program designed to find a middle ground of flood prevention for localized areas upstream and to fill the gap between conservation on the individual farm and the big dam structures on the main rivers.

Action in the Salem Fork Watershed, one of 62 such experimental and demonstrational projects designed to test the practicality of such an approach to flood prevention and watershed protection, started with detailed surveys by technicians of the Soil Conservation Service experienced in watershed questions. They found less than 9 percent of the land to be in Classes I, II, and III, while 34 percent was in Class IV, 39 percent in Class VI, and 18 percent in Class VII. Their intensive study showed neglect of the watershed farmlands, severe sheet erosion, depletion of organic material, with weeds dominant, and poor condition of forest lands due to overgrazing and overcutting of mine prop timber.

The technicians located potential sites for flood detention structures and roughly figured


"Before" picture of the Glenn Post-Clarence Rogers dam site, seen from U. S. 50, 2 miles west of Weston.


"After" picture of the completed Post-Rogers dam; banks are seeded to grass, roadway has been relocated, drainage area feeds dam's pool.

what conservation practices were needed on each farm in the watershed. Then the sponsoring organizations—the West Fork Soil Conservation District and the Upper Tenmile Watershed Association—developed an initial work plan on a 5-year basis which provided for cost sharing.

The principal measures include 7 floodwater detention structures, 2 miles of stream channel improvement, 4 miles of logging road stabilization, 100 acres of tree planting and fencing above the structures. The dams will detain runoff from 1,943 acres, or about ⅓ of the watershed, and there will be 1 structure on each of the 4 subwatersheds, with a total of 5 on Jacob's Run. Another dam, recently constructed, provides the water supply reservoir and was built by the city of Salem at a cost of $128,000.

Land treatment for conservation of water

Board of Supervisors, West Fork Soil Conservation District: Chairman G. Manley Curry, Kenneth Kayser, Chester M. Cunningham, Harley Bond, Ray C. Hudkins, and J. Earl Arbuckle.

and watershed lands, with mostly off-site benefits, provide for improvement of vegetative cover by retirement of steep eroding lands to woodland or wildlife uses and by practices designed to improve the cover.

While less glamorous to the average American than the flood detention dams, these conservation measures reduce runoff, increase infiltration into the soil and hold the water and soil above the dams. Thus, the dams are assured longer effectiveness by protection from siltation. The plans call for 557 acres of tree planting, 450 acres of contour stripcropping, 141 acres of pasture feeding, 3 miles of diversion terraces, 1,645 acres of woodland, protection ponds, and other practices. Farmers, and indirectly city people, already are benefiting from the planting of more than 309,000 seedlings, the construction of 6 farm ponds, the treatment of 431 acres of pasture, and the installation of a sizeable part of the other planned land treatment measures.

By the end of this year 5 of the 8 major structures, including the water supply dam, costing a total of $210,000, will be in operation. Indications are that the height of a severe local flood this last August was conderably reduced. In several other instances of minor storm flows the control work prevented flood damage—this, at times when other cities in the valley experienced severe property damages and even loss of life from uncontrolled flood waters. The apparent success of this cooperative project, in which the Soil Conservation Service, the Forest Service, the Geological Survey, the Weather Bureau, the Conservation Commission of West Virginia, and other agencies each played a significant role, has greatly impressed many community groups beset by similar flood problems.

The Salem pilot project's financing presented problems which are under study. The experience of the Upper Tenmile Watershed Association in obtaining easements and rights of way for flood detention structures pointed to the inadequacy of voluntary money raising.

Despite these financing troubles, which are being experienced by most watershed organizations throughout the country, remarkable progress is being made in the watershed movement. The Salem project was chosen as 1 of 8 evaluation study watersheds in the United States because of its size and its high degree of accomplishments. Invaluable scientific data of benefit to our future watershed knowledge are being gathered. And the story of the Salem watershed project helped win the top 1954 National Conservation Speaking Contest prize of $1,000 and a trip to the San Diego, Calif., meeting of the National Association of Soil Conservation Districts for Clarence M. Rogers, Salem and Clarksburg landowner and attorney.

With ½ to ⅔ of all our flood damages occurring upstream on our main streams, the Salem watershed assumes important in "piloting" other watershed groups to deal successfully with their unsolved problems. Salem's accomplishments in flood and sediment reduction, in correction of severe water supply problems, and in increased agricultural and recreational income provide striking evidences of what can be achieved.

FARM WOOD CROPS

(Continued from page 131)

ers by taking the lead in a campaign to establish wood as a farm crop. The symbolism of agriculture is a subtle thing. It is built up, it grows, it becomes established gradually by intangible steps. But once established, it becomes a powerful force. Wood as a farm crop can become something taken for granted—something that every good farmer will accept as a matter of course.

No agricultural agency has heretofore attempted to put such an idea into agricultural teaching. The Service is in a good position to

do it. It will not be easy. It cannot be done rapidly, but it is the foundation stone of farm woodland work which has never been laid. I call upon the Service to accept this task, to take advantage of this opportunity to get wood as a farm crop accepted and advocated by the fraternity of agricultural teachers and leaders, and through them put into practice by farmers.

Then farm woodland work will take on new meaning in the conservation program; it can become the keystone in the conservation arch. Integrated conservation itself will have a reality now lacking when the woods are not a part of it. A foundation under the farm woodlands becomes part of the foundation under the whole farm conservation program. The latter is thereby strengthened because a presently weak member becomes strong. Forestry can aid the farm conservation program mightily. It is worth helping; it is worth recognizing as a full-fledged member of the agricultural family. This is an opportunity to render a mighty service to agriculture.

UNDERPLANTING PINES.—J. H. Sharp, of Eros, La., a cooperator with the Dugdemona Soil Conservation District in Jackson Parish, hand-planted 22,000 pines on 22 acres of his 95-acre woodland tract. He could not succeed in open fields, so he underplanted his pines in stands of low-grade or worthless hardwoods where the young trees were protected from drought.

Linton Jones, work unit conservationist, demonstrates the planting of a pine seedling with a planting bar.

J. H. Sharp, woodland owner in Jackson Parish, examines a 15-inch seedling following first growing season. This area, hand planted, had hardwood control by girdling.

Planning assistance was given by Linton Jones, work unit conservationist, and there was a 3-man planting crew. Total cost was $12 an acre—$6 for deadening the hardwoods and $6 for planting the pines.

When the stand was examined about 10 months later survival was found to be better than 90 percent, with a height growth averaging more than 12 inches. Underplanting of low-grade hardwoods was successful also on three woodland farms in adjoining Winn Parish.

"This is the only way I could see a future in this timber farm," Mr. Sharp said. "In 4 years, I expect to have my $12 back from increased value of the land."

In this section of the State near Jonesboro nearly all the open field plantings made during the 1953-54 planting season were lost, owing to extreme drought.

One of the first steps in reaching the objective of maximum timber production on every acre of forest land is to have the forest land fully stocked with trees that will produce the most valuable timber products.

In the upland timber sections of the State, where pine is the most valuable species, there are many areas of low-grade hardwood without pine seed trees or pine reproduction. These areas can be started toward maximum production of valuable species by underplanting and deadening.

Underplanting during drought periods results in satisfactory survival because (1) there is less loss of moisture because of lower soil temperature and (2) there is less movement of hot air which would bring about moisture loss.

In open field plantings, on the other hand, the hot air draws the moisture out of the needles of the pine seedlings faster than the roots can replace it. This results in loss of seedlings.

There's no better contest prize than a subscription to this magazine.

REVIEWS

AGRICULTURAL LAND RESOURCES IN THE UNITED STATES. AIB No. 140. By Hugh W. Wooten and James R. Anderson. 107 pp. 1955. Washington, D. C.: Superintendent of Documents. 55 cents.

THIS publication examines the nation's land resources available to meet present requirements. It also takes a look at future needs. The facts and estimates presented will be of interest to those concerned with these resources and their conservation.

Projections of recent trends in the development and conversion of land indicate that total cropland—in use or idle—may reach 508 million acres by 1975, an increase of 30 million acres, or 6 percent, over 1950—"if present public programs and related farm improvements go forward at about the same rate as they have done since 1945." It is estimated that one-half or more of this increase will come about through conversion of acreage now in permant pasture to crop rotation. It is pointed out further that, although some permanent pasture goes into the cropland rotation, an increase of about 75 million acres in improved permanent pasture is likely. Total land available for pasture and grazing may decline by 25 million acres, or 3 percent, by 1975. This reduction would bring the total acreage of pasture and grassland down to 925 million acres, if rotation or cropland pasture is excluded.

Total woodland is expected to be maintained at near the present level. Clearing is occurring at a fairly rapid rate in some areas, while reforestation is proceeding in others. The rate of clearing is influenced by the suitability of land for cultivation or pasture. The area of cropland, including rotation pastures, probably will increase because of the development of new land and the shifting of permanent grassland pasture into the cropland rotation. The area of land suitable for cultivation converted to urban, industrial uses, and such purposes as highways, airports, and recreation will continue to increase. (Note: A recent survey by the Soil Conservation Service shows that over a million acres of land suitable for cultivation is being shifted to nonagricultural uses each year.)

Land available for crops rose from 431 million acres in 1909 to 478 million in 1949, with an upward trend continuing. Cropland, idle or in crops, increased from 347 million acres in 1909 to 409 million in 1949. It should be pointed out here that the acreage of cropland harvested to grow feed for horses and mules decreased from an average of 90 million acres in 1910–1914 to 30 million in 1945–49, and at present represents about 78 million acres less than in 1910. There has also been a decrease of 55 million acres of pasture used for grazing horses and mules.

The agricultural acreage used intensively is increasing, but the pattern of land use is also changing. Some of these changes involve (1) a shifting of cash crops, primarily cotton, from the Southeast to the Mississippi Delta, western Texas, and California, this being accompanied by higher yields per acre and higher total production; (2) increases of hay and other feed crops in some regions, resulting in better quality and higher yields; (3) continued increase in acreages of improved pastures and fenced pastures in several sections, along with increase in numbers of better types of beef and dairy cattle and more feeder stock.

Pressure is continuous for conservation improvements. The acreages of improved pasture have increased significantly in all South Atlantic States because of the diversions of cropland and the improvement and development of formerly abandoned fields. Clearing and drainage have added to this increase. The economic advantages of pastures are emphasized particularly in the case of land not well suited to cultivation.

Changes to a more adequate and palatable diet in recent years have meant and will continue to mean a considerable increase in consumption of livestock products, particularly milk and milk products and high grade meats. This indicates a shift to a higher, rather than a lower, per capita acreage required to produce livestock products. Only higher yields from cropland and pasture will offset this need for increased acreages.

Economic and other factors affecting land use are discussed and it is pointed out that "Temporarily large stocks, such as those accumulated in 1948–49 and again in 1952–53 have tended to be evened out because of later fluctuations in production, expanding requirements, and development of better methods of distribution and storage."

Although the total acreage of cropland used for crops has changed slightly since 1920, higher yields per acre have brought materially increased production over the last 20 to 30 years. The authors recognize and emphasize the place of proper land use and soil and water conservation programs in the long time agricultural picture. While there is at times overproduction of some crops, expected buildup of population poses the permanent problem of making the most productive use of our land resources.

—John W. Barnard

GRASSLAND FARMING. By George E. Serviss and Gilbert H. Ahlgren. 146 pp. Illustrated. 1955. New York: John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16. $2.96.

THIS book is one of the Wiley farm series written for agricultural students, farmers, and farm service employees. There are 12 chapters of interesting subject matter. Well chosen photographs and line drawings help to keep up reader interest and aid in explanations. A list of selected readings and appropriate questions at the end of each chapter guide the reader in search of additional information.

The style of writing is simple and direct. The sentences are short and the meaning is clear. The authors succeed in treating a somewhat technical subject with refreshing simplicity. It invites reader attention from the grades to college.

The subject is broad, covering everything from grass as a crop, a description of selected grasses and legumes, and a discussion of managing pastures and hay crops, to a chapter on equipment that is needed in grassland farming.

Soil conservationists will be pleased to find frequent references to the value of grass in the control of erosion. One complete chapter is devoted to conservation cropping. The statement, "If we could keep our sloping land covered with grass-legume sods, our erosion problems would be largely eliminated," is well supported. In discussing the conservation methods to be employed the authors discuss land capability, crop rotations, contouring, stripcropping, terraces, and grass waterways.

The book makes good reading and leaves the reader with the impression of the little boy who, after drinking the last drop of his favorite drink and noting the bottom of the cup, seems to ask: "Why isn't there some more?"

—A. D. Stoesz

THE AGRICULTURAL REGIONS OF THE UNITED STATES. By Ladd Haystead and Gilbert C. Fite. 288 pp. Illustrated. 1955. Norman, Okla.: University of Oklahoma Press. $4.

THIS new book by two well informed authors tells you where to farm in the United States, what to grow, and how to apply the newest methods and equipment. It is a concise guide giving land values, soil types, leading crops, annual yields, and changing directions in agriculture.

The Agricultural Regions of the United States presents an interesting array of up-to-date factual information on American agriculture and provides useful information on such important topics as:

1. Values of farmland and the factors which determine buying and selling prices.
2. Long-term shifts in American agricultural production; what areas are best suited for certain types of farming and ranching; where not to establish certain programs, and why.
3. Crop and livestock production, by areas and states; their size, value, dependability for income, and marketing.
4. New techniques and equipment and this country's agricultural revolution.
5. Current problems facing the farmer and rancher, what can be done to solve them, and a prediction of what may be expected in the future.

The authors demolish the myth about the *typical* American farm and provide a fabulous amount of information about the diversity in American farming and ranching.

—B. W. Allred

Green are our Pastures

By CARL E. BUTLER

This was the winning essay in the 1954 New England Green Pastures Contest. The author is a 15-year-old lad of Lenox, Mass. His father is a cooperator with the Berkshire Soil Conservation District.

THE green pastures forage program is keeping us in the dairy business. Better pasture and forage enable us to produce more milk at less cost. In these times of high grain costs and low milk prices, milk can be produced most economically on large amounts of high quality roughage and a small amount of purchased concentrates.

When we moved to our present farm 7 years ago, there were no legumes. In fact, there was nothing but wild grasses growing in the heavy meadowland. The previous owners had sold all the cow manure to gardeners in a nearby city. They had made no attempt at reseeding or topdressing. On the entire farm we didn't cut enough hay to winter our 13 registered Jerseys. By following the green pastures forage program, we have brought the farm to the point where it produces enough roughage for our present herd of 50 head. Moreover, our roughage program is still improving.

Soil tests showed that we needed about 3 tons of lime to the acre to bring it to the proper pH for legume crops. We also found that ladino clover grew very well on our heavy meadowland. Because of our heavy soil, most of our seeding is done in early August. The field to be seeded is plowed after a cutting of hay is taken off. A fine seedbed is prepared and about 3 tons of lime and 400 pounds of 10-10-10 commercial fertilizer are applied. A mixture of timothy, alsike and ladino is seeded with 2½ bushels of oats per acre.

When the oats are about 6 to 8 inches high, they make very good late summer or early fall pastures. The oats then winterkill and the next summer we have a good field of hay. Our permanent pastures provide our cows plenty of feed in the spring. The herd is rotated around these pastures until we get a cutting of hay from the meadows. After topdressing with about 300 pounds of 0-20-20 per acre, the meadows provide summer grazing as needed. In the late spring the young stock are put into the back pasture. As the grass gets short, the animals that are to freshen in the fall are put with the cows.

This year we plan to plant a few acres to millet so that more of our clover can be saved for second cutting of hay. In addition to supplying summer grazing, the millet will act as a smother crop, killing out the old sod before reseeding. In some of the real wet spots we planted a mixture of Reed's canarygrass, timothy and clover. On this land 300 pounds of 10-10-10 were applied before seeding.

The weaving and curving Housatonic River forms the west boundary to our farm. This leaves several points jutting out into the river. On these points we planted ladino and timothy, using 300 pounds of 10-10-10 fertilizer and 3 tons of lime to the acre. On all the land that we seeded we used about 15 pounds of the ladino-timothy mixture to the acre.

My father feels that most of our land is too heavy for alfalfa. However, we seeded some of our dryer land with alfalfa-brome mixture last fall. We used 3 tons of lime and 400 pounds of 0-20-20 to the acre. Although it is still too early to tell how successful this seeding will be, we are hoping that we will be able to work alfalfa into our roughage program.

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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OUR SOIL ★ OUR STRENGTH

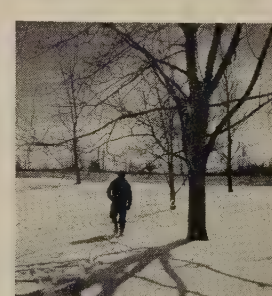
PERSIAN PROVERB.—An item in the Foreign Agricultural Service News Bulletin at Tehran, Iran, tells of the soil conservation work being done by Manucher Ahmadi, an attorney and farm owner. Ahmadi started the farm 17 years ago from nothing. Today the land produces an average of 5 tons of various farm products daily. Ahmadi is especially proud of his peach, apple, and pear trees that he set out himself one by one and has since given his personal care.

Pointing to his fruit trees recently, Ahmadi said: This is the best monument that one can build for himself." Then he quoted from a Persian poem: "Others planted and we ate the fruit of their labor; now we should plant for others to eat."

BETTER THAN HAULING.—"But for my farm pond, it would have taken one man with a pickup 4 months to haul water for my cattle."

That was one way in which a farm pond served Joe Miller of Jefferson, S. C., during a dry spell. Miller is a cooperator with the Chesterfield Soil Conservation District.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Long shadows on the snow lend winter enchantment to this Maine farmstead.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

He Will Always Remember

Incident at New Hampshire Church

By ALLAN J. COLLINS

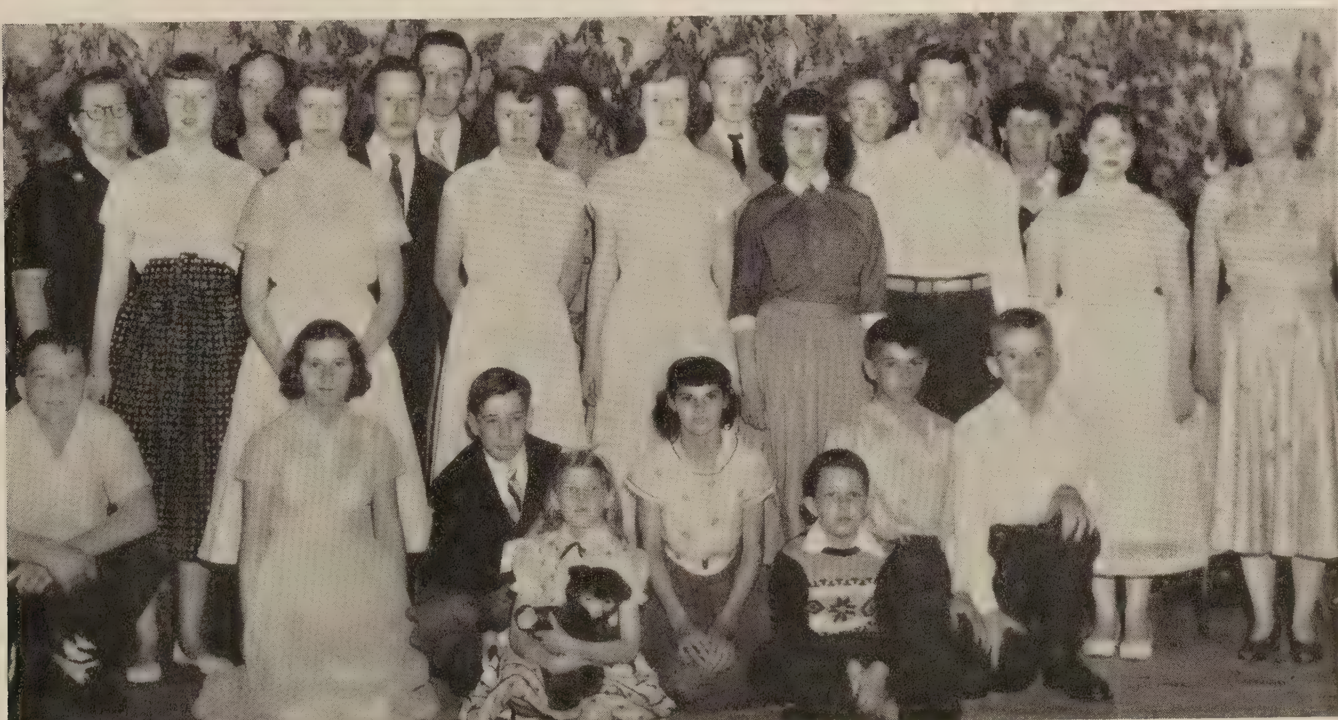
IF someone, someday, asks me to recount the most satisfactory experience of my life as a conservationist, almost certainly I shall hark back to the graduation exercises at Union (population 400), N. H. There, Helen Abbott and Florence Gerrish teach 8 grades in a little, 2-room schoolhouse and this is really their story. I was but an eyewitness to what I shall always consider a beacon light on conservation's own road to Damascus.

The tiny, white church that serves as a public auditorium was overflowing when I arrived. I am sure half the town was there. Seating myself with a work unit conservationist and a soil surveyor I began to get a glimmering as to why SCS had been invited. The hall was alive with conservation displays—soil profiles, posters, tree samples, photos, animal track models, and drawings—all done with the flamboyant abandon of young hands and minds. And conservation sprang alive in the program.

A hush settled over the audience, including the well-scrubbed and glowing youngsters, with the first soft notes from the organ. Then a choral group of women—school mothers I learned later—arose and sang the first of a number of remarkable songs interspersed throughout the ceremony—songs of the soil, of the forest, the waters, and wildlife. Tunes from some ancient hymnal, lyrics of their own devising.

The minister spoke and the strong, heady poetry of the Bible rolled across the rafters, speaking Man's love of the land, his devotion

Note.—The author is state conservationist, Soil Conservation Service, Durham, N. H.



Cast assembled for conservation pageant.

Conservation story is told in song.

and infidelities to it through the ages. The school superintendent followed suit, in his own manner and outlook.

Now all eyes turned to the children in their moment of glory in the proceedings. Each in turn took the floor and I could hardly believe my ears. We heard about soil, water, animal life, and forests. A 12-year old delivered as fine a history of the U. S. Soil Conservation Service as I've ever heard. We heard too about the Fish and Wildlife Service, the Forest Service, and State agencies and what they were doing for conservation.

Helen Abbott.

Another 12-year old spoke on the life of Dr. Hugh Hammond Bennett, father of soil conservation. Another discussed the life of Gifford Pinchot, pioneer of modern forestry. A little fellow went to the model animal tracks, identified them, told us all about the species and how they fitted into the local wildlife conservation scheme.

As I listened to the clear, childish voices, ringing with sincerity, how I wished that all my associate conservationists scattered across our broad land could have been there to feel the thrill of new inspiration for the task that still stretches over the horizon. I am certain that they, like the SCS-men present, would have glimpsed once again the ideal that drew us into this strange and wonderful calling.

A few more of the remarkable songs, then the diplomas, and the graduation exercises ended. But the memory will live on forever, as far as I'm concerned.

(Continued on page 155)

Japan Works to Control Erosion

By SHOZO TSUJI

JAPAN has erosion problems, too. And it is very serious to this country because of its excess population and small cropland area.

This report is written about erosion problems of Nanyo District in Ehime prefecture, one of the erosion problem areas in Japan.

Nanyo district is the southwestern part of Shikoku Island, one of the four main islands of Japan. It is very mountainous land of about 700 square miles. It consists of rias coast, few small plains, and many hills and mountains. So that crop fields exist almost on top of hills and steep hillsides or mountains.

Steepness of slopes where crop fields lie are generally from 20 to 45 degrees and rarely over 50 degrees. The construction of crop fields is mostly bench type terrace with narrow platforms, between 2 and 5 feet wide, and unprotected earth risers, although in some part they are protected by stone wall or weeds. In some villages, weeds on risers are removed cleanly, by reason that they absorb fertilizer.

Owing to lack of catch drain, rainwater overflows from field to field. Crops, cultivated here, are chiefly barley in spring and sweetpotato in summer. In some villages, citrus fruits grow extensively.

In managing of crop fields, green manure, compost, and other organic manures are not used, although crop residues such as straw and runner of sweetpotato are utilized as "agoshiki," that is to lay them on top of riser to prevent it from collapse or waste of soil. Therefore, humus content in soil is very low.

Note.—The author is a professor at the Matsuyama Agricultural College, Matsuyama, Japan.

Eroded cropland.

> In submitting this article, Professor Tsuji wrote:
>
> Please receive this letter and report, here enclosed.
>
> I am learning about erosion control. During the war I read "Soil Conservation" by Mr. H. H. Bennett in Tokyo, under bombing of American air forces, continued day after day, and now I read your SOIL CONSERVATION monthly at Matsuyama.
>
> This report is written about Nanyo District which lies near Matsuyama and is one of the erosion problem areas in Japan.
>
> I shall be much obliged, if you kindly introduce the content of this report to Americans who are interested in foreign erosion problem, through your SOIL CONSERVATION monthly.

Annual rainfall of this district is about 70 inches in mean, and intense rainfalls occur in the rainy season of June, so-called "Baiu," and in typhoon season of autumn.

Under these natural and artificial conditions, above stated, there can be seen every type of erosion. We see everywhere sheet erosion in platforms, gully and rill erosion in risers of bench terraces, and slip of crop fields covers 2 or 3 acres.

The Japanese government, recognizing importance of erosion problem, has fostered soil conservation work, since few years. Soil conservation area, established by farmers who intend erosion control of their crop fields, can receive subvention. Plan of works is designed by prefectural government engineers. Total area of soil conservation areas, established so far, is about 2,900 acres. This is about 10 percent of total steep hillside crop fields area in Nanyo district.

The conservation works in this district are mainly to build drainage channel across hillside. Channel is lined with concrete. Its cross section is rectangular. Sandbox and drop are inserted in drainage line adequately.

These works will bring good result in erosion control of this district, but it will also be necessary to protect risers of bench terraces by stone wall or useful grasses. Stone wall work is the

Crops cultivated to top of steep hill.

best measure to prevent riser from erosion, but its high cost will limit its application. Sodding of riser with low growing legumes will serve as not only erosion control measure but resource of organic matter or forage.

One of another problems in this district is that topographical condition of cropland requires very hard labor in agriculture. Owing to lack of road which can pass car, all loads such as crop yields, fertilizers, and so on, must be carried on back or shoulder, passing through steep narrow path.

It is reported that there are found many patients of neuralgia, pulmonary emphysema, humpback, etc., by reason of overwork in agricultural labor. To improve this circumstance, roads which can pass car with two wheels, and simple cables are under construction on steep hillside, here and there. Construction of roads and cables will help erosion control indirectly, by making it convenient to apply soil conservation measures.

Writer hopes that Nanyo district becomes one of the best soil conservation districts.

MAP HIS RECORD.—D. I. Ross, Jr., of Blackville, S. C., makes full use of his conservation plan map. Recently he outlined how he uses it.

He said: "The land use map with my conservation plan is something that I keep before me at all times. I have made 30 duplications of it and am setting up a file putting all information pertaining to terracing on one, liming on another, crop rotations on another, and so on. I use it to record the application of planned conservation practices as they are applied, giving date, fertilization, grazing days, yields, and similar facts.

"I sketch in amended practices as they are planned with a technician. After applying measures as shown on the map, I have noted that I no longer have the damage from erosion that I once had. This includes wind and water erosion damage."

Research Noted

By A. B. FOSTER

MORE than 400 Kentucky bankers, soil conservation district supervisors, county agents, and Soil conservation Service workers got a close look at modern farming at the 1,047-acre research station near Coshocton, Ohio.

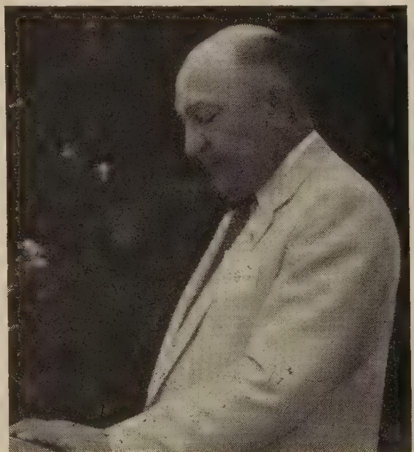
They saw a 65-ton block of earth so delicately balanced on scales that one man could tip it. The weight of this block is recorded automatically every 10 minutes. The variations in weight reflect the change in moisture in earth. They give information as to the water-holding capacity of the soil under varying climatic, crop, and tillage conditions.

The tourists heard Lloyd Harrold, project supervisor, expain such things as chopped hay mulch on corn, studies in grass waterways, and corn planted right behind the plow with no further tillage.

The Kentuckians learned that chopped alfalfa blown on corn increased the moisture content of the top layer of soil by 12 percent. It increased the corn yield nearly 20 bushels last year.

The visitors saw skim plowing that helps save soil while a pasture on a 20 percent slope is reseeded. They noted living fences of multiflora rose that hold all kinds of livestock and provide fine cover for quail and other wildlife.

The Kentucky Bankers Association sponsored the tour in cooperation with the Kentucky Association of Soil Conservation Districts.



L. M. Campbell, president of Kentucky Bankers Association, talks to touring group.

Land Leveling Moves East

Research and farmer experience show that this practice can help more farms than previously held likely.

No. 12

This is the twelfth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By T. W. EDMINSTER

LAND leveling and grading equipment, until recent years seen in few fields outside the western irrigation areas, is moving into many parts of the East. New research and farmer experience indicate that land leveling can improve the land on many more farms than had hitherto been thought likely.

Land leveling, or forming, is simply the grading and smoothing of an area to remove natural pockets and depressions, erase scars made by farming implements and management practices, and provide a basis for a continuous and uniform row grade. The uniform row grade aids in uniform irrigation and drainage with safe, nonerosive speed of flow. Land leveling also gives a smooth uniform surface that makes precision planting and speedier cultivation and harvesting easier. It reduces machine wear and driver fatigue.

Land leveling studies were started on sugarcane land in Louisiana in the early forties. Ditch spoil banks and the excess soil on the headlands and back furrows were used to fill major pockets and low spots. This operation was followed by precise grading and leveling to give a slope of 3 to 6 inches per 100 feet towards the drainage ditches. The result was higher cane yields. The 4-year average yield from 105 acres of average sugarcane land, that had been properly graded, showed an average increase of 5.81 standard tons of cane an acre. With the average cane price at $7.82 a ton, this resulted in a net increase of over $45 an acre. Records showed that grading average sugarcane land took 4½ to 5½ hours an acre for a cost of about $45 an acre.

Note.—The author is agricultural engineer, eastern soil and water management section, soil and water conservation research branch, Agricultural Research Service, U. S. Departmest of Agriculture, Beltsville, Md.

Cotton drowned in depression that land leveling could correct. Such pockets make timely and efficient machine operation difficult.

These studies are being extended to other areas. For example, on cotton land near St. Joseph, La., studies in the first year indicate favorable results from grading due to removal of low spots, plus improved conditions for high speed precision planting and cultivation.

Recent studies at Fleming, Ga., and in eastern Virginia, indicate that land leveling improves drainage efficiency by providing positive drainage to the field ditches on the troublesome Bladen soils. In Virginia, first year results show that by grading to provide positive row drainage, the distance between the costly quarter drains may be greatly increased.

Land leveling on organic soils in eastern North Carolina are also proving successful in filling the many depressions caused by old stump holes, implement scars, and uneven settling. These wet pocketed areas cause much delay and lost time in tillage, cultivating, and harvesting. Also, yield is greatly reduced because crops are drowned out or stunted in these pockets.

In the first studies it was found that there was less trash interference on the organic soils when a large rotary-type tillage tool was used about 2 months before and immediately preceding the leveling operation.

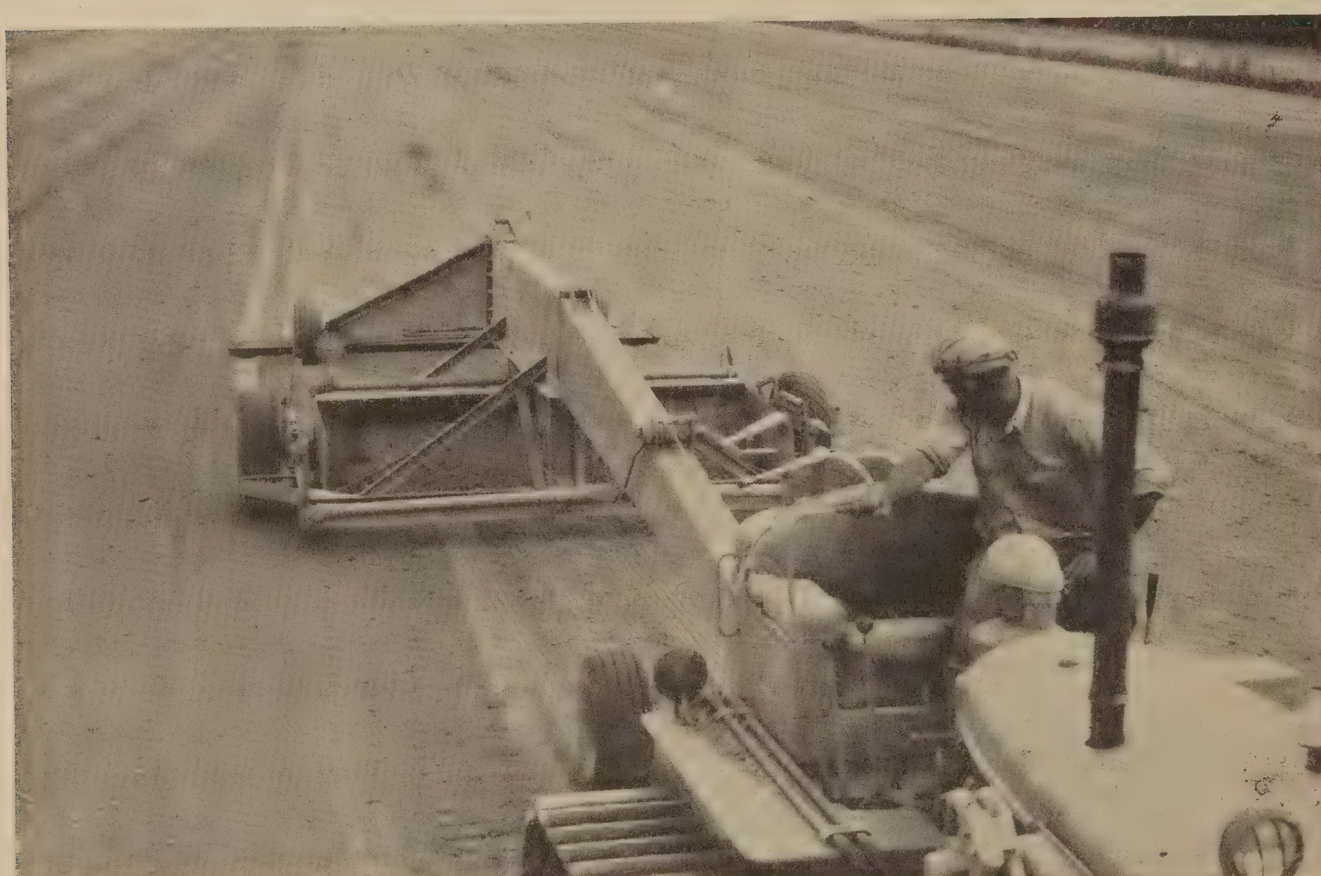
The large Hightstown Dairy at Hightstown, N. J., has for the past 4 years, used land leveling equipment in preparing its seedings of hay and pastureland. C. H. Conover, farm manager, estimates that his haying, grass silage operations, and pasture clipping programs were speeded up 30 percent on the smoothed fields as compared with those not yet smoothed. In addition to higher speed operation of equipment, there was also less machine damage and operator fatigue.

Both experiment station and Soil Conservation Service workers in Alabama have shown that land leveling principles can be used to remove small knolls and fill minor low areas so that parallel or equally-spaced terraces may be readily built on sloping fields. These parallel terraces make the use of multiple row-crop equipment easy. The smoothing operation provides a more uniform seedbed to help precision planting.

Land leveling or land forming is by no means new in the field of irrigation. Research workers and practical irrigators throughout the West have learned that surface irrigation on an area that is not leveled and graded results in great waste of water, and crop and soil damage where salinity is a problem.

These same hazards are growing in importance in the East. Throughout the Mississippi Delta large areas are being graded for furrow and border irrigation. Similar interest is developing in parts of the Coastal Plain.

For example, at Freehold, N. J. John Albis, owner of a small but intensively cultivated



Precision grading and smoothing is done by this floating, hinged type of land leveling machine.

Where shallow field ditches are built as part of land leveling, removed earth is used to fill old stump holes and surface pockets.

truck farm, is reforming his fields to use furrow irrigation. Overhead irrigation with water of high iron content has discolored his leafy vegetables. Actually, Mr. Albis is getting a double benefit. His leveling for irrigation has also removed low spots and pockets in which as much as 30 percent of a sensitive crop has been drowned out in past years.

A question is sometimes raised as to what effect the soil profile disturbance has upon crop yields. Experience has shown that in most instances the large volumes of soil needed to fill depressions can be taken from areas where the topsoil is above average depth due to development of headlands, back furrows, and spoil banks. In the few instances where topsoil is reduced in depth by the leveling operation, a well-planned soil fertility and organic matter management program, coupled with the improved drainage resulting from the leveling, quickly offsets yield decreases.

The principles of successful land leveling under Eastern conditions closely parallel those for the West. Careful topographic surveys must be made to assure precision work with the least expenditure of time and energy.

Since many of the Eastern areas involve fairly high yardage for filling depressions and lowering spoil banks and headlands, the dozer-scraper combination has been found highly effective. The dozer is used for hauls up to 300 feet and the scraper on longer hauls.

A dozer may also be used in combination with a motor grader. The grader cuts down the spoil banks and headlands and moves the material into a position where the dozer can get behind it to spread it where needed. These combinations are used for the rough grading that brings the land to within about 2 inches of final grade. Then a land leveler is used to form the exact grade and slope desired.

Under eastern conditions the floating type leveler with a hinged frame has proved best. The floating feature makes it possible for the machine to cross field ditches. The hinged frame makes it easier to handle the machine on the smaller fields found in the East.

It is highly important that grading and leveling be done when the soil is dry enough for normal tillage operations. Handling of wet soil by heavy equipment quickly causes severe compaction. For example, compaction resulting from grading a Louisiana sugarcane field when it was too wet resulted in a 50 percent drop in crop yield the first year. Only salvage cane was available for harvest the second year.

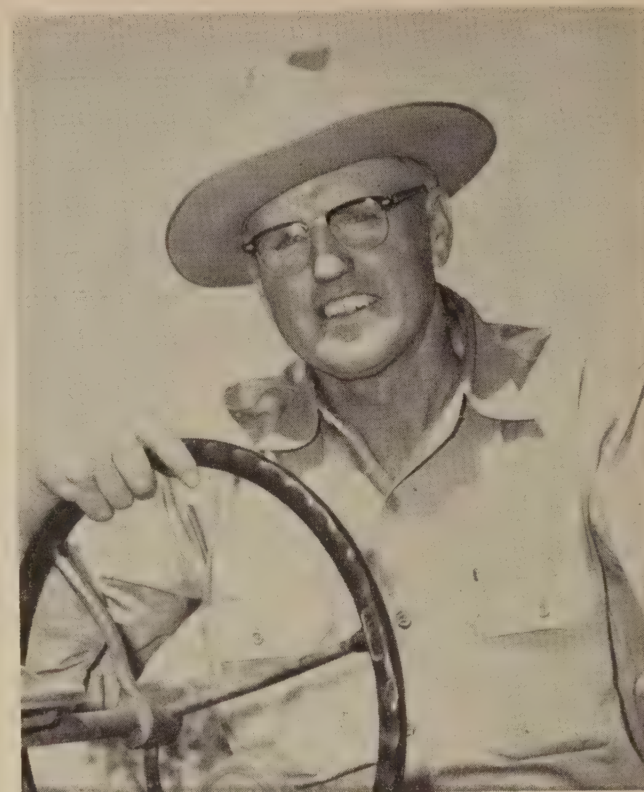
Land leveling is headed for widespread adoption throughout the East. Its growth is indicated by the use of more than 1,200 land leveling machines in Louisiana alone. One manufacturer reports sale of over 400 machines in southern Illinois in recent years. Other States report similar trends.

There will be a growing interest in, and demand for, land leveling as current research programs report their findings. Of particular value will be facts on the economic and physical limits of the practice.

Two things will influence the adoption of land leveling as a standard farm practice. They are (1) wider experience on techniques of soil management to offset the effects of intensive soil handling; and (2) more facts on the value of land leveling in solving irrigation, drainage, and other soil management problems.

DISTRICT PROFILE

G. MARION HINCKLEY of UTAH



G. Marion Hinckley.

G. MARION HINCKLEY has needed only a few years to change 500 acres of swamp and flooded land into a high-producing dairy and grain farm. A sound, well-planned soil and water conservation program has been the key to his success.

In 1945, as an Extension Soil Conservation Service demonstration farmer, Marion Hinckley led the way toward the organization of the Timpanogos Soil Conservation District in Utah County, Utah. When the district was organized in 1947, he followed through as the No. 1 cooperator and a district supervisor. He is now president of the Utah State Association of Soil Conservation Districts. Through a dike and drainage system, Hinckley has converted 250 acres of swampy wet land into 50 acres of alfalfa, 20 acres of silage corn, 45 acres of barley, oats, and wheat for feed mixture, 87 acres of improved pastures, a 2-acre fish and water storage pond, and plenty of land for feed lots, barns and 2 homes.

In the early 1930's when Marion Hinckley took his farm over, less than 65 acres were being used. It was low-producing farm and pastureland.

The Hinckley holdings border Utah Lake 3 miles west of Provo. All of the land has been flooded from time to time, depending on the lake's water level which is controlled by spring snow runoff and summer rains.

By dike and pump, Hinckley has slowly pushed the shoreline farther and farther out. Now 300 acres are behind the dikes; another 200 acres extend out into the swampy shoreline. As he says: "Work for my boys to do when they take over and help build more good land for the people of America."

A 125-head dairy herd of Holsteins roam the pastures and fields. Hinckley maintained a milking herd of sixty-five 428-pound cows for the 1954 testing year. "We are now pushing away over the 428-pound production per cow," Hinckley said recently.

The milking herd uses 6 pastures of 4 acres each with a mixture of alfalfa, clover, smooth brome, orchard and alta fescue grass. The cows are on a rotation of 4 days grazing per pasture, clip, an irrigation, and on to the next pasture. This rotation allows 24 days for regrowth. Cool water of even temperature is always within a short distance in both summer and winter. Nearness of water promotes cow health and aids in high production. The young stuff and 10 head of horses graze a 65-acre pasture.

The corn field produces 18 tons of ensilage an acre. Barley, oats, and wheat make 75 bushels or better. Alfalfa cuts 5 tons an acre and up on 3 or 4 cuttings a season.

The Utah farm is both surface and subirrigated. Hinckley controls the water table by 1,500 feet of dikes, 11,000 feet of ditches, many drops and gates, and a pump. He has leveled 88 acres and laid 200 feet of pipeline. Ditches and borders supply and control the surface irrigation waters.

He raises all the feed for the dairy herd on the farm excepting a little supplement.

The Hinckleys have 5 children, 3 boys and 2 girls. Phillip, 18-year-old FFA member, received the Utah Junior Farmer award for 1954. Twenty-one-year-old Thomas K., eldest son, is on a church mission in western Canada for the Church of Jesus Christ of Latter-Day Saints.

Marion Hinckley, as well as being a busy and progressive farmer and soil conservationist, takes time out to serve his church and state. He is a retired bishop of his church and member of the High Council West Utah Stake. He is a member of the the State Soil Conservation Committee, the Provo Planning Commission, the Farm Bureau, and the Provo Chamber of Commerce. He is a director, Utah Federated Milk Producers Association, a leader in flood control work, and manager of his church stake farm. While Bishop of the Sunset Ward he directed the building of the first new chapel in Provo in 20 years.

A modern home for his family, a second for his dairyman, a new, modern milking parlor, a 1,000-gallon milk cooling vat, and loafing barn grace the Hinckley farmstead from which 2,000 pounds of grade-A milk go to market each day.

—Ralph Felker

Small Unit Is Success

By JOHN BONOMO, JR.

CONSERVING the range on small farm and ranch units has been a problem in New Mexico. But maintaining range in top condition has proved profitable for Noel L. Burton of Solano.

Burton has a grade herd of shorthorn cattle. He sells calves. He's a cooperator and supervisor of the Mesa Soil Conservation District.

Burton owns and operates 1,600 acres, with 320 acres in cultivation. He has maintained the fertility of his soil to produce good crops. He keeps organic matter in the soil so it will absorb and hold moisture. This practice helps to reduce wind erosion and keeps a supply of plant food in the soil for crop production.

Note.—The author is work unit conservationist. Soil Conservation Service, Mosquero, N. Mex.

Noel L. Burton (standing) uses crop stubble to help control wind erosion.

Burton leaves crop stubble on the field to help reduce wind erosion and hold moisture. He holds his stocking rate to a conservative number, normally above 30 acres to the animal unit yearlong.

Burton has four separate pastures on which he has been practicing deferred grazing for years. This practice provides a large volume of winter forage. In this way he avoids having to produce or purchase large amounts of feed to carry his livestock through the winter.

The value of Burton's conservation program is reflected in their modern home and other improvements, and their latest type of farm machinery. In addition, they have raised and educated four children.

NEW HAMPSHIRE INCIDENT

(Continued from page 148)

Of course we know some of the background of this unique event. Both Mrs. Abbott and Mrs. Gerrish have twice attended the annual summer conservation workshops at Lost River Camp. This admirable project of the Society for the Protection of New Hampshire Forests has frequently called on SCS and other agency specialists for guidance in the 1,000-acre "classroom" at Woodstock.

But the two teachers had taken more back to their school than their conservation instructors ever hoped for. Their own ingenuity must be credited with their success in introducing resource-appreciation into practically every branch of the curriculum.

Water Use and Water Rights

Local individuals and groups are taking initiative in seeking fair, lasting solution of grave problem

By C. E. BUSBY

IT was at a Bowie, Ariz., Civilian Conservation Corps camp, near the head of San Simon Creek, that I first fully awakened to the importance of water rights on the state and local scene.

A group of us were attending an outdoor workshop on watershed planning. It was in the early 1930's. It fell to my lot, without warning to state the general plan of our planning party. Here's about what I said:

"Each soil type and subwatershed is entitled to that portion of the precipitation and surface runoff as may support a protective and sustaining plant cover, guarding against erosion and economic loss to the rancher. The remainder of the runoff which finds its way into stream channels and to which others have rights of use must be allowed to pass on so the irrigators, communities, and states below will be able to use their fair share, the water to be as free as practicable of sediment."

That was quite sweeping and general, but it served the purpose!

Little did we realize then that ground water at great depth would produce cotton on a large scale and support a larger community at the Bowie crossroads in 1955.

Little did we realize that the concept of wise watershed use and management would some day be a land and water policy of the nation. Nor could we visualize then that locally governed soil conservation districts would later be a guiding influence in applying this policy.

Today, people in many states, East and West, are examining existing water policies to see if they are geared to growing populations and to expanding industrial, agricultural, and recreational water uses.

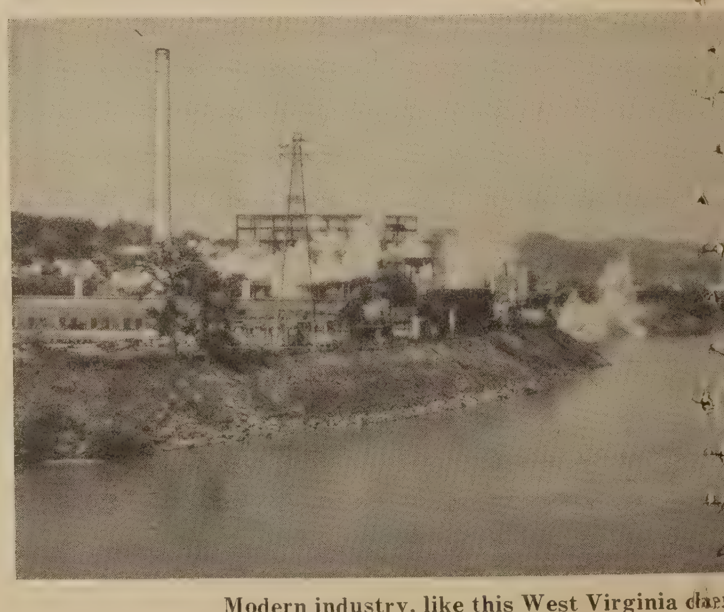
As state leaders study local and statewide water use problems, they find many questions of public policy that strike them with sledge hammer force. Some questions have no ready answers! A few seem to have but they are slow coming to the surface.

First, what is the core of our water use problems?

It centers on local water shortage and lack of availability in most states. Water is not available if it is polluted, or too deep in the ground, or if it is at hand at the wrong time. The important point for consideration is an adequate supply of usable water at the time and place where needed most. This local shortage situation may be on the farm or in the factory or town but often involves the small community watershed.

Second, is the nature and extent of water usage different from what it was in 1935?

It is quite different. Requirements are greater now. And there are many more water users and many more uses for water. For example, 100-bushel corn takes a lot more water than 40-bushel corn. And at critical growth periods. So it is for many items of production.



Modern industry, like this West Virginia c

Note.—The author is water rights specialist, Soil Conservation Service, Berkeley, Calif.

The American people have done wonders in industrialization, based largely upon water use. They have done such a good job that water now is a principal limiting factor to future economic expansion in certain localities.

Third, what is the significance in light of modern needs, of water supply measured in terms of average annual rainfall and streamflow?

Average annual supply figures aren't enough! We have to consider available supplies and needs with reference to soil moisture deficiencies, ground water and streamflow deficiencies, reservoir and snow storage deficiencies, and any other factors limiting local supply when water is needed most. Figures for the typical dry year might afford a useful index.

We must also recognize demand itself and pollution as affecting availability of water for use. The whole subject of net water availability to meet increasing demands over the years is as vital to the farmer and soil conservationist as it is to other users.

Fourth, are supply factors the same over the nation?

Factors vary from North to South, East to West, upland to lowland, community to community, and even soil type to soil type. Each state is a pattern of problem areas determined by characteristic supply factors. But shortage may be a common denominator cutting across

...al plant, uses a tremendous amout of water.

problem areas and state lines owing to predominance of certain factors.

Fifth, is water supply related to legal rules as to rights of use?

When the supply is enough for all needs there is little competition for and conflict over water use. Less is then required in the way of regulation by law except as regards water damage.

But when the supply becomes less than the need, such as to adversely affect economic enterprises, means for providing a fair division among all users are important. One means is conservation by structures and good land use on a watershed basis.

Another means is a system of law providing rules of guidance in stream development and use helpful in getting the most beneficial use of water and in avoiding or settling conflicts of interest over division of supplies.

Physical and legal means ought to go hand in hand so that a wise balance between natural and interrupted streamflow may be achieved. One means without the other may not be enough.

Sixth, is it possible to develop a system of state water law to help meet present and future needs of localities as well as state as a whole?

As yet, there are no readily acceptable overall solutions for some states. Much depends upon the seriousness of water shortages and growing demands of users in one or more local problem areas in each state. Much depends upon the attitude of established users, especially those requiring continuous streamflow.

Conditions in critical areas indicate the need for change. Necessity often provides the driving force among leaders seeking improved legislation.

Seventh, what is being done about our growing water use problems?

Many groups are working to find suitable law and program answers. In addition to citizens' committees, state study commissions and waterboards, these groups include the National Association of Soil Conservation Districts, several colleges and universities, Council of State Governments, Conservation Foundation, American Bar Association, National Reclamation Association, American Farm Bureau Federation, Izaak Walton League, and the National Watershed Congress.

Eighth, are there ideas that will stimulate further discussion and study on this subject?

Here are a few broad suggestions.

Western States have learned by long and costly experiences that a quantitative guide to the conservation and division of surface waters in short supply is fair and practical of administration for most conditions. The average western water user and administrator has confidence in this system which helps the application of engineering and legal principles to water use problems.

Some leaders feel that the western system of prior appropriation is too rigid. That there is too much emphasis placed upon security of investment and statewide control of development and use. That the system is not flexible enough to allow reservation of supplies to meet future needs, especially for nondepleting uses of fish, wildlife, and recreation.

But many leaders seem to go along with the aim of western water law that encourages conservation. Their main question seems to be how this aim can best be attained.

Some students of western water law believe that the system needs strengthening, particularly as to standards of beneficial use in their relation to land use and soil conservation, reservation of supplies to meet future needs, and methods of administration. Western legislatures and water agencies are working progressively to accomplish these things. South Dakota has recently revised its water rights code. California is moving toward the establishment of a new overall Department of Water Resources to cover all aspects of water.

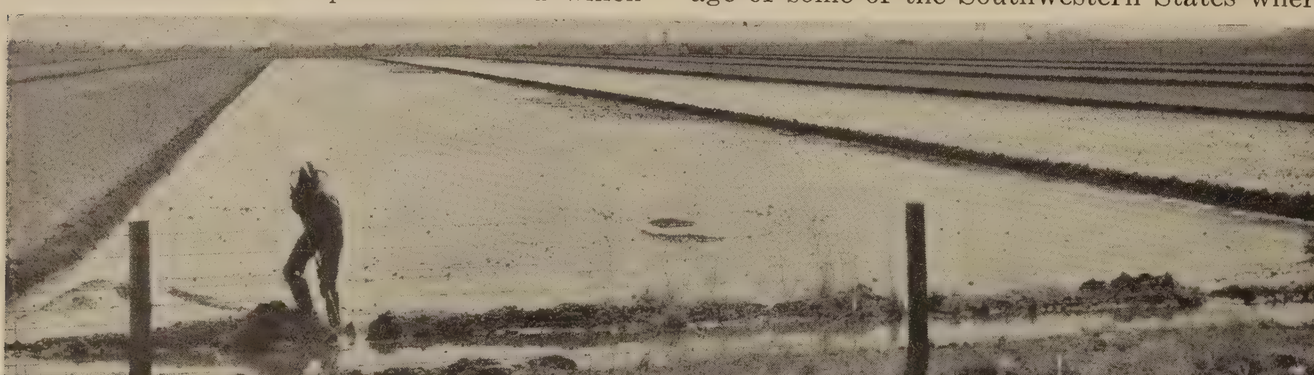
Several Eastern States have adopted elements of water policy similar to those in the West, though there is wide variation. But to put such policy into effect in the Eastern States is another matter. It's the procedures used which raise major points for discussion, especially as to how far natural streamflow should be interrupted to permit greater storage and depleting uses.

States to the north, having somewhat more dependable water supplies and somewhat less demanding climate, such as those around the Great Lakes and St. Lawrence River, seem to have been moving in past years toward a statutory permit system to control new consumptive or depleting uses with limited change in the existing common law. This tends to emphasize lands touching defined water bodies and uses which do not deplete streamflow. It is recognized that maintenance of streamflow and lake levels is important to existing nondepleting uses in some of these states.

But drought and expansion of water uses in recent years, especially in States like Michigan, Ohio, Kentucky, and Indiana, have focused attention on the needs of new as well as existing water users, particularly cities and irrigation farmers. Indiana is taking concrete steps to meet this situation by seeking reasonable adjustments in the common law.

States to the south, with somewhat less dependable surface water supplies in the critical season of need, more exacting climate, and rapidly growing demands for water, have done little about their water laws until recently. Now some of them appear to be seeking a system of statutory permits involving moderate changes in the common law of stream development and use which will facilitate greater storage and depleting uses but protect existing lawful uses.

In this connection it may be noted that the acreage of irrigated lands in Louisiana, Arkansas, Florida, and Mississippi approach the acreage of some of the Southwestern States where



Border irrigation in Colorado. Crops are taking increasing amounts of water as irrigation spreads even to humid areas.

irrigation has long been a common practice. This requires a large seasonal consumption or depletion of streamflow and ground water. This and other trends may call for physical and legal solutions similar to but not necessarily identical with western principles.

Perhaps the pattern of water uses and supplies may determine the type of common and statutory law combination that will finally emerge in each Eastern State. (The term "pattern of water uses and supplies" is used here to mean the particular combination of two or more of the four principal water uses—agricultural, industrial, municipal, and recreational—in its relation to climate, streamflow and ground water). This seems to have been the trend over the nation from our early history. The use and supply pattern is much different in Florida, Mississippi, Ohio, West Virginia, and Iowa. The crux of the problem is the competition between the old nondepleting uses and the new depleting uses.

Last, are there guideposts that may be helpful in seeking solutions?

Yes, there seems to be a number.

As opposing uses come more into conflict, some sort of quantitative guide is required which encourages storage, conservation, and fair division of the supply among all those in need, yet protects all lawful existing uses. Thus, statewide administrative control of development and use seems necessary in some Eastern States to assure application of such a guide. Streamflow isn't confined to counties either. But before statewide control can come about, the major water use groups properly insist that they have an important voice in administration of control policies.

Another guidepost is that minimum flow required to serve domestic, fish, recreation, and industrial and municipal waste disposal purposes should not be unduly interrupted or tapped for new depleting purposes, except in emergencies or under special circumstances. This would seem to call for statutory limitations on diversions and uses and the coordination of quantity and quality control measures exercised by state waterboards. A system of special permits might serve this purpose. It also calls for reduction in discharge of sediment and other wastes at the sources and, where practicable, increase of low flows by upstream reservoir releases. We must guard against making existing pollution problems worse; we must seek fair means for their solution.

Texas irrigation well gushing 4,000 gallons of water a minute.

Flood flows can be tapped for all types of uses, with fewer complications arising. This begins with the capture and wise use of diffused surface runoff on farms and in small watersheds having due regard, however, to the rights of downstream users. It continues where practicable by control, development, and wise use of flood waters after they have entered stream channels. Some system of statutory permits would seem to be required. Perhaps those who invest their funds in these endeavors ought to have rights in and to the increased storage and streamflow in proportion to their investments.

Development and use of normal streamflow might be approached with caution to assure full protection of established lawful uses as new uses expand. Much untapped or unused normal flow can be put to use, otherwise it may continue to waste into the sea. Some can be reserved for future uses within or among the watersheds of origin. Perhaps a system of temporary use permits would serve the purpose of controlling but encouraging new depleting uses until a sys-

tem of permanent permits seems feasible and desirable. If so, the period of permitted use should bear a realistic relationship to the time required for amorization of investments in new water developments.

As to ground water, the States seem to be progressing toward a local control system authorized by state enabling legislation and referenda. This appears to be a healthy trend, for it recognizes the importance of local control to meet variations in geology, ground water supply and replenishment, and land and water use. But it is slow in coming. More understanding of ground water is needed if local leaders are to assume their proper responsibilities in this field.

Connecticut pasture gulps huge swallows of irrigation water.

One of the major gaps in the field of water law and administration is the lack of efforts to seek a unified approach to surface and ground water control and to quantity and quality control.

We know that the normal flow of streams is supplied largely by ground water. (Normal flow includes minimum flows but not the flows resulting from runoff). We know that most of our ground water originates with precipitation which soaks into the soil and then trickles down into the underlying rocks. The development and use of one source of supply may affect other sources. Yet this is not adequately reflected in our water law systems, especially in the old common law. Nor in recognition of the interdependency of agricultural and nonagricultural uses dependent upon these related sources of supply.

The reduction of normal flow may result in increased concentration of pollution wastes harmful to fish, wildlife, livestock, human beings, and other users. Increase of normal flow may have the reverse and beneficial effect. Economics is involved in these relationships. Yet our systems of water law and administration do not reflect this relationship enough. Responsibility is not properly placed in some states to assure coordination of control efforts.

However, there are encouraging signs in a few states. Broad support for the proposal to establish a new Department of Water Resources in California is recognition of the need for unification.

In South Carolina and Mississippi the water study commissions have recognized the need for a unified approach more in harmony with the water cycle and the influence man has upon it.

We all need to put more effort into furthering these broad objectives—not for the sake of seeking more controls but rather to help make minimum controls and maximum voluntary cooperation more effective and economical.

New developments in the field of water law and administration call for original thinking and fresh ideas, for water is vital to our economic progress and modern life. But these new ideas should be tempered with the full background of all our American experience, legal and nonlegal, East and West. These steps can best be served by tapping the judgment of local leaders.

In many states local leaders—lawyers, engineers, bankers, farmers, teachers and legislators—are studying water-use problems, analyzing their findings, and recommeding solutions. Clair Guess of South Carolina, Sam Thompson of Mississippi, Box Tsinger of Georgia, Dave Weaver of North Carolina, John Sims of Ohio, Anson Thomas of Indiana, Marvin Melton and Joe Barrett of Arkansas, Harry Rieck of Maryland, Wheeler Milmoe of New York, Joe Prendergast of Iowa, and Francis Lindsay of California are just a few of the many able leaders devoting much time and effort to this problem.

Soil conservation districts, state farm bureaus, and other state and local organizations are taking the initiative for bringing together leaders from all water-using groups and legislative assemblies in joint study of this common problem.

Cagney Turns To Hardy Cattle

By EZRA I. SHAW

JAMES CAGNEY is convinced that Scottish Highlander cattle are the kind of beef animal he wants on his Martha's Vineyard, Mass., farm.

In trying out the Scottish Highlanders, the popular actor was seeking a breed of beef cattle that could stand extremes of cold and dampness. He thinks he has them. Listen:

On last winter's coldest night, with zero temperature, one of Cagney's Scottish Highlander cows dropped a calf on the frozen pasture. Didn't even bother to come into the barn.

When Paul Mayhew, then farm manager, checked up the next morning, he found the cow and her calf doing okay.

"Those Scottish critters don't even come near the barn," Mayhew said. "That's all right because it saves a lot of barn work. And the cattle don't mind—they want to stay out. They browsed all winter long on the ends of brush. And by golly they looked just as good at the end of the winter as they did at the start. And all we fed them was a quart of grain apiece daily and some poor quality hay. Those babies can take it when it comes to cold and thick, foggy, penetrating dampness."

Starting with two cows, a calf, and a bull, Cagney is building up his Scottish Highlander herd gradually. He is increasing his herd as he improves and develops his pastures and meadows to feed more cattle.

Note.—The author is work unit conservationist, Soil Conservation Service, Vineyard Haven, Mass.

These cattle can take a lot of cold.

Paul Mayhew (right), then farm manager, and Ezra Shaw, SCS technician, inspect birdsfoot trefoil and bromegrass seeded as part of pasture improvement plan.

Cagney has had his island farm since 1926. In 1952 he became a cooperator with the Dukes County Soil Conservation District. As a cooperator he agreed to give his land all the soil and water conservation measures needed to prevent erosion and improve the soil for greater production.

In 1953 the district supervisors awarded Cagney a silver cup for his conservation work.

Whenever he can get away from Hollywood, Cagney takes a hand in running his 200-acre farm. The Soil Conservation Service has helped him on technical matters.

Cagney has been building up the usefulness of his farm by liming, fertilizing, and seeding his fields to good grazing and hay crops. Scientific soil tests tell him how much to lime and fertilize.

This example shows what Cagney has been doing: In one unproductive field he planted winter rye and vetch. The next year he made it into a profitable meadow by planting a mixture of 3 pounds of red and 12 pounds of alsike clover and 10 pounds of bromegrass an acre.

With calf born outdoors in zero weather, Cagney cattle graze native pasture.

At seeding time he put down 600 pounds of 8-16-8 fertilizer an acre. He topdresses the field each year with 600 pounds of 0-15-30. He keeps lime content up to the level figured best for the grass and clovers.

Cagney has also improved his pastures by liming, fertilizing, and planting them to top-quality grazing grasses and clovers. He has cleared brush and boulders to turn idle fields into profitable grazing and hay. He has built ponds to provide water for livestock, fire protection, and recreation.

In carrying out the woodland improvement part of his conservation work, Cagney has removed low-quality trees. This gives the high-quality trees a better chance to develop into moneymaking size. He has planted various kinds of valuable pines to fill gaps in his woodlands. Idle, bare spots best suited for woodland also get planted to trees.

RECOGNITION FOR TWO. — For "distinguished achievement in soil conservation" honorary memberships in the Missouri Association of Soil Conservation Districts have been conferred on Kenyon G. Harman, of the Soil Conservation Service, and Charles C. Clayton of the St. Louis Globe Democrat.

The awards were made in August at a banquet in Hannibal, Mo., by Henry Blesi, past president of the State Association and chairman of his own Franklin County Soil Conservation District.

Harman has devoted his life to agricultural work, starting with the Soil Conservation Service when it was first established in 1933.

Clayton was cited for his direction of a Soil Conservation Awards Program in Missouri, which is now concluding its fourth year of activity.

ENRICHES LIBRARY.—Supervisor George Patrick of the Orangeburg County (S. C.) Soil Conservation District presented $50 worth of additional literature to the Orangeburg Free Library at the conclusion of the Smokey Bear Vacation Reading Club. The club was sponsored by the library, South Carolina Commission of Forestry, and the district.

It was reported that 1,000 children used conservation reading matter previously given to the library.

REMINDER—Friends of conservation can make *more* friends by giving subscriptions to this magazine; price $1.25 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The Springs Run Again

By ARNOLD W. PITMAN

WHEN Edson Gifford was a young man on his farm near Randolph, Vt., hillside springs supplied his household water needs. But along about 1925 or 1926 the springs began to dry up every summer. Gifford had to haul water.

The only thing that had occurred in the meantime was that the hillside had been laid bare. All the trees had been removed to make a pasture. The pasture never was worth a hoot.

Now the springs are running again. All year long. Cool, fresh, and clear. And the only thing that has happened in the meantime is that Gifford replanted the hillside with trees. Trees that have commercial value. Trees that will add to farm income.

Gifford has been reforesting other hillsides of his farm. His tree planting has improved not only his own place. It has brought benefits to a neighboring farm.

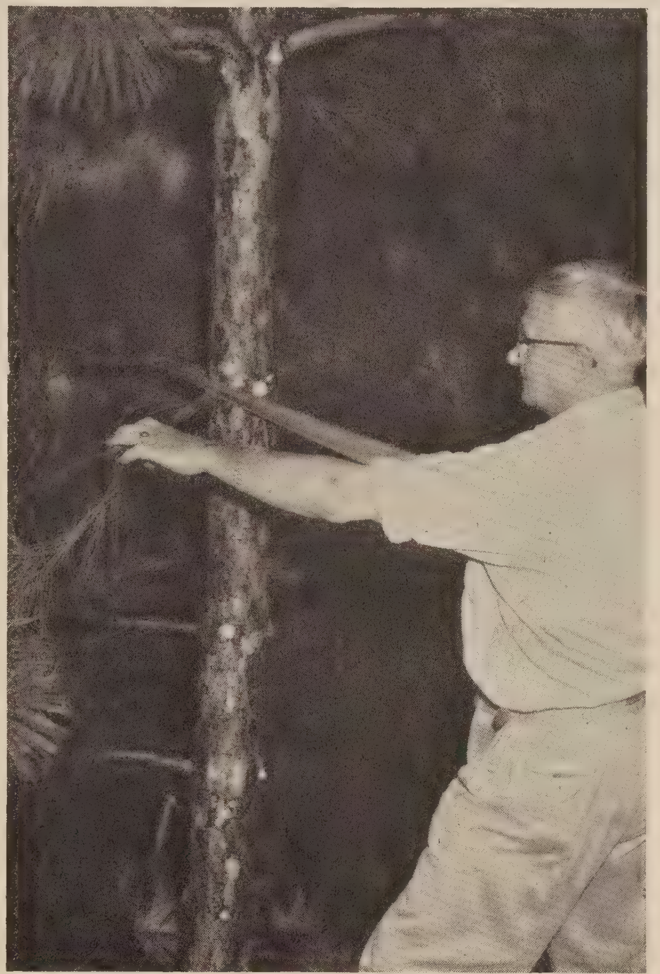
"Before I put trees on a hillside that drains into my neighbor's farm, he used to get a flash runoff every spring," Gifford explained. "Often the runoff damaged his place. Like the year it took his farm pond out. He told me the other day that he doesn't have runoff trouble anymore—not since the trees got their root systems down and litter made a cushion on top of the soil. Besides, his whole moisture situation is better."

When Gifford began his tree replanting work a dozen years ago, the hillside was bare and bleak as a new battlefield. It had been badly eroded by years of exposure to rain and snow and runoff.

Today you wouldn't recognize that hillside. Under Gifford's careful managment, the plantation has prospered. You'll see no bare spot on that hillside now.

The original plantation was ready for its first pruning last fall. In another 10 years, barring fire, disease, and other calamities it will be ready for its first pulpwood thinning.

Note.—The author is work unit conservationist, Soil Conservation Service, at Randolph, Vt.



Edson Gifford pruning his woodland.

"I planted the trees in the first place to stop erosion," Gifford said. "The hillside was no good for grazing—it didn't produce enough forage. The topsoil was being washed down the slope. Two gullies had started and they were getting big fast. When I was a boy, there was no sign of a gully.

"I've stopped the erosion. That was my first concern. The running springs are just a bonus for good farming, I figure."

"Of course the main thing is that I put my land to its best use. That's the basic conservation principle: putting your land to its best use or, as we sometimes say, using your land within

Springs were summer dry at this time, soon after Gifford replanted bare hillside. (Photo reprinted from *Esso Farm News*).

its capabilities. And giving it whatever treatment it needs to protect it against erosion and to improve its fertility or productiveness."

Gifford speaks with authority on the conservation program. He has been a member of the broard of supervisors of the White River Soil Conservation District since its formation early in 1940. He has been its chairman for the past 10 years. As such, he shares responsibility with the other four supervisors in directing the district's operations.

Gifford did not stop with his first planting of trees on his steep slopes. He has continued to plant trees every year since then.

That first hillside planting covered 35 acres. He has since planted 45 acres more. He has also filled in empty spots in his woodlands. In all he has put out well over 100,000 seedlings. In planning his woodland work he has had the help of Soil Conservation Service technicians and foresters from the Vermont Department of Forests and Parks.

"I have 50 acres to go," Gifford said.

The trees in the first plantation are 15 to 20 feet high. They average 4 to 6 inches in diameter. They are mostly red and white pines. Some Norway spruce and Scotch pine.

Gifford thinks that he himself may not reap any cash benefits from his trees. But he figures his children and grandchildren will. He has a son and 2 daughters, 5 grandsons and 2 granddaughters. His son, Edson, Jr., teaches agriculture to GI's. He's a World War II veteran, a lieutenant colonel in the Air Force Reserve. He helps his dad on the farm as much as his teaching job permits.

"I'm hoping he'll take over completely this year," Gifford said. That would make it a third-generation farm.

Same spot 10 years later. Hillside is again covered with trees and springs are running year-round once more.

Methodists Consider the Land

"This subject is as important as God and the Universe, because we are all dependent on food and land for life itself."

SO SPOKE Bishop H. Bascom Watts of Lincoln, Nebr., in opening discussion at one of the 16 group meetings of the National Methodist Town and Country Conference at Bloomington, Ind., last summer.

The subject was "Land, Food, and the World Situation." T. S. Buie, State Conservationist, was study leader.

After four sessions with professional soil conservationists and laymen participating, recommendations were made to guide the Methodist Church in its rural activities during the next 25 to 50 years. They included—

1. A long-range program of teaching stewardship of the land and natural resources.
2. Emphasis on and support of forces working in the field of land and food.
3. Enlistment of agricultural and home economics students as agricultural missionaries for service at home and abroad.
4. Close cooperation with workers in the Soil Conservation Service, Extension Service, vocational agriculture, vocational homemaking, and voluntary organizations such as the Farm Bureau, Grange, and Farmers Union.
5. Use of Rural Life Sunday and harvest festivals to emphasize stewardship of rural life, using the resources of all rural groups in developing programs. It was suggested that the church cooperate with soil conservation districts in utilizing Soil Stewardship Week prior to Rural Life Sunday on field days for ministers.

The first session had Gladwin E. Young, deputy administrator of the Soil Conservation Service, as panel leader. The second dealt with "Food and National Welfare," in which Alexander Nunn, executive editor of *Progressive Farmer,* was leader. Raymond W. Miller, consultant to FAO, was the leader of the third study session, which considered "Land, Food, and the World Situation."

With the first three meetings as background, the study group in its final session sought answers to the question "What Can We Do About the Problem?" Dr. Ralph A. Felton, Drew Theological Seminary, Madison, N.J., was the leader.

The discussions clearly recognized that proper land use and food distribution are keystones to world peace. As one member put it, "If food does not cross borders, then soldiers will."

Panel members included such widely-known soil conservation leaders as W. F. Hall of Sparta, Ga., representing the National Association of Soil Conservation Districts; J. B. Douthit of Pendleton, S. C., oldest soil conservation district supervisor in length of service; and T. T. Traywick, Methodist layman and cooperator with the Orangeburg (S. C.) Soil Conservation District.

Approximately 1,600 delegates—full-time religious workers, laymen, and laywomen from all over the country—attended the 4-day conference. In addition to the sessions of the 16 study groups, there were meetings in which all delegates participated.

PREFER DRY FEET.—Mr. and Mrs. Allan J. Huggins, who live on Back River Road in Dover, N. H., have solved a vexing problem in growing a living fence of multiflora rose. The Huggins, cooperators with the Strafford County Soil Conservation District, take pride in growing good living fences. But some of their land is heavy, poorly-drained soil in which multiflora rose ordinarily makes unsatisfactory growth. In such places Huggins has used a rotary tiller to throw soil against the base of the rose bushes until a ridge is formed.

The roses respond to dry feet by better growth. Huggins planted a new fence last year. Prior to planting, he bedded the wetter sites up about a foot. After settling, the beds provided a site that was drained well enough to assure good growth of multiflora rose. In a year the planting was more than 3 feet tall.

Huggins cultivates his rose fences with the rotary tiller. He fertilizes and mulches them. He uses poultry manure for fertilizer. That, according to studies at Cornell University, has proved the best kind for strengthening weak areas in multiflora rose fences. The Huggins' excellent care of their living fences has produced vigorous growth, ornamental beauty, and is attractive to birds.

—Floyd V. Barker

An Early Conservationist

AT one time he was one of the largest landowners in the country, owning some 50,000 acres of land. Some of this was in joint ownership on the present site of Oriskany monument in the Mohawk Valley, N. Y.

He adopted the "live fence" to protect his woodlots, but wrote that he was convinced "no hedge will do—where two- or four-footed hogs find it convenient to open passage."

He recognized corn and tobacco as soil removers and complained in a letter in 1795 that "neither my overseer nor managers will attend properly to anything but the crop they have usually cultivated; and if there is the smallest discretionary power allowed them they will fill the land with Indian corn although even to themselves there are the most obvious traces of its baneful effects."

He gave up the cultivation of tobacco entirely and tried to limit the growing of corn. He used his steeper lands for woods and pasture, and worked out a system of cover crops.

At the time of his death he was following a 7-year crop rotation which was well adapted to sustain and hold his soil. He noticed that the one-crop system resulted in gullying in fields, but failed to recognize that the more subtle sheet erosion was causing him more damage than the gullying.

He gave minute directions for repairing these gullies—first filling them with trash and brush and seeding them down with grass and a grain. He topdressed the seeding with manure. He also collected honey locusts and planted them along deep gullies to enable the roots to hold the soil in place.

He went so far as to dig and haul silt and mud back up the hills to fill the gullies they came from.

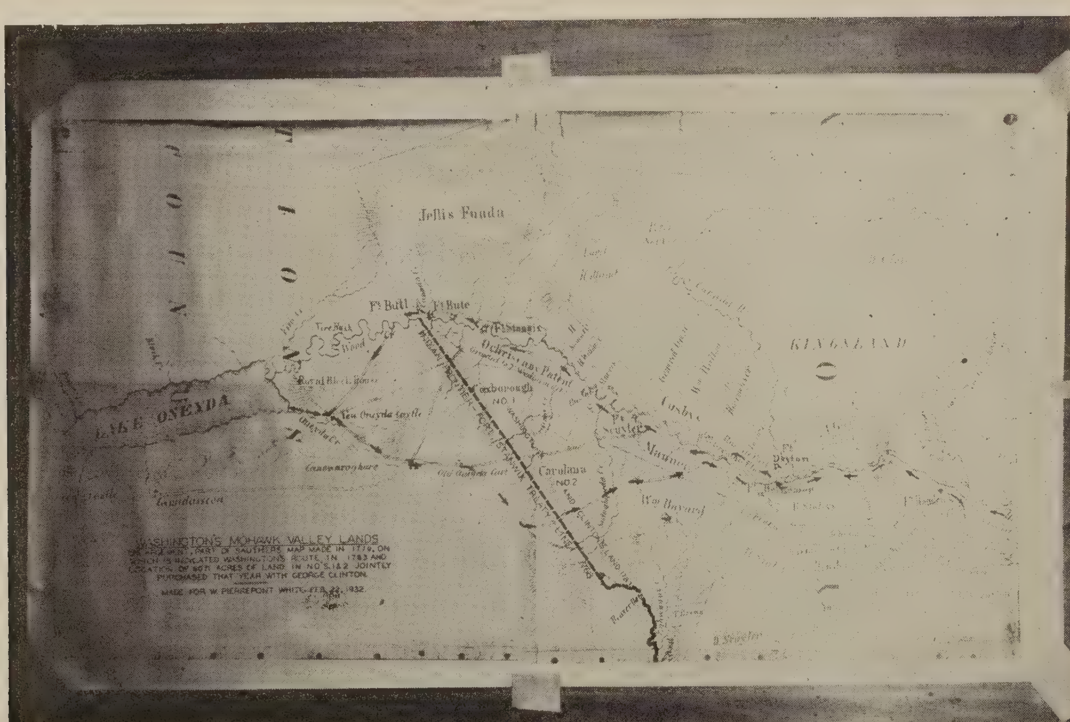
In doing all of these things he was constantly at war with custom, superstition, ignorance, and human cussedness.

His agricultural experiments led Thomas Jefferson and others to adopt a "contour' cropping system some 15 years after his death.

Who was this farmer, this experimenter, this soil conservationist who was so much ahead of his time?

We call him GEORGE WASHINGTON.

—FRANCIS E. MULVANEY



REVIEWS

TOPSOIL AND CIVILIZATION: By Tom Dale and Vernon Gill Carter. 270 pp. Illustrated. 1955. Norman, Oklahoma: University of Oklahoma Press. $3.95.

I think I like this book because it is neither complacent nor frightening. It has purpose but no mission. It is factual.

Most conservationists know that there is a relationship between Man's destiny and his use or abuse of soil. What this new volume does is to comb the evidence and weave it, strand by strand, in a strong and convincing rope of logic.

The book makes no pretention to original research. But it has been years in the making. It is the result of vast labors in libraries, in correspondence, in examination of published and unpublished data, in personal observations and meticulous note-taking. There has been much weighing and measuring and balancing. Many ingredients have gone into the final distillation. The result is a tremendous story which should be *required* reading in the schools and *desired* reading everywhere else.

I think I like this book, too, because it is well written, well arranged, well illustrated, and well printed. That's a lot of "wells" which add up to pleasant reading. An important book such as this is doubly effective when made pleasant to the eye and hand and easy to read. The authors not only are men of the classroom, they also are men of the land. They tell and teach without pedantry.

In the opening chapter it is stated: "With the advent of civilized man, about six thousand years ago, the soil-building process was reversed in most areas where he resided: the quantity and quality of soil and the amount of life the soil supported all began to decline." I suspect that is the sentence which sets the theme for the book. It also sets the stage for quibbling and controversy, for there are a few hardy dissidents among our scientists who are still unwilling to accept the historical record.

The larger attention is devoted to a review of what has happened in the Nile Valley, Mesopotamia, the Mediterranean region, the countries of the Near East, North Africa, Italy, and Sicily. There is a chapter dealing with western Europe, another with Far Eastern areas, and still another, of course, with the United States. It is by no means a completely tragic story of land depletion and decadent civilizations, for this book is as modern and realistic as hybrid corn or the soil conservation districts. What *is* happening is as intrinsic to the tale as what *has* happened. There are maps and photographic illustrations in generous numbers, placed with the text for the convenience of the reader rather than grouped together for the convenience of the publisher.

Dale and Carter have produced a thoughtful history of human society as it has developed or destroyed itself by its use or misuse of the land. This kind of history is with us today, as we strive the world around to nurture our teeming millions and to meet the increasing needs for food and fiber. It is a timely and urgent, but not impatient, book. It offers wisdom rather than panaceas. Conservation, it declares, "is largely a way of thinking and a way of living. It is as fundamental as honesty and thrift, and it must be achieved in much the same way . . . through universal education . . ."

—Wellington Brink

WATER—THE YEARBOOK OF AGRICULTURE. 751 pp. Illustrated. 1955. Washington 25, D. C.: U. S. Government Printing Office. $2.

THE United States Department of Agriculture yearbooks have provided much information that has been helpful to the public. Many believe that the yearbooks "Soils and Men," "Climate and Man," and "Grass" are truly great books in the field of American agriculture.

To this select group can be added the Yearbook of Agriculture for 1955 "Water," which has just been released.

In the yearbook preface Editor Alfred D. Stefferud observes: "There's a lot to be known about water. We know the symbol of water but little about its properties, which can make us comfortable or uncomfortable, rich or poor, secure or insecure. We cannot live without water; we could live better if we knew more about it."

The yearbook "Water" contains the greatest amount of useful information on water that has ever been assembled into one volume. In its pages 95 topics have been covered by the best talent available in the Department of Agriculture. These scientists have concentrated on the following broad subjects on water: Our Need for Water; Where We Get Our Water; Water and Our Soil; Water and Our Forests; Water for Irrigation; Water and Our Crops; Our Ranges and Pastures; Gardens, Turf, and Orchards; Drainage of Fields; Water and Our Wildlife; Pure Water for Farms and Cities; and A Look to the Future.

A large part of the text is directed toward the conservation aspects of water. There's much execellent material on water conservation problems and practices for land used for crops, range, forest, and wildlife. Watersheds—big and little—are highlighted and discussions cover matters of legislation, laws and programs for conservation treatment, including flood control and watershed management.

There's some information on different types of flood damage that is not generally known. For instance, the average upstream damage is about 545 million dollars annually. Sediment damages also amount to 100 to 130 million dollars a year.

A big part of the damages in headwater valleys is agricultural—nearly 70 percent of the total. About 45 percent of the damage is to growing crops, pasture, and range. Damage to land in the valleys is especially significant from the viewpoint of total agricultural resources because the land in the flood plains of creeks and rivers usually is highly productive. Destruction of agricultural property along upstream areas is about 15 percent yearly.

Annual destruction in major river valleys is 500 million dollars, of which 165 million dollars is agricultural damage. Downstream sediment damage is about 28 to 30 million dollars per year. Sediment damages usually are nonagricultural.

There is little on the subject of water that the yearbook "Water" fails to cover at least in some degree. If you go in for water-witching, there's a chapter that will interest you. It was written by a practicing dowser who vouches for his work.

—B. W. ALLRED

VOLCANO PROBLEMS.—Is it possible to reclaim rock for crop production? What is the best method to speed up soil formation?

These are the most commonly heard questions among farmers in the lower Puna Soil Conservation District in Hawaii.

The island of Hawaii is the largest in the Hawaiian Archipelago. It was built by five volcanoes, of which Mauna Loa and Kilauea are active periodically.

Until February 28, 1955 there had not been an eruption in the Puna section of the island for 155 years. Then within hours the people of the Puna district suffered great hardships. While forests comprised the largest acreage of land covered with molten lava, the sugarcane areas represented the greater value.

Sulfur fire, pumice deposition, and lava flow did the major damage. Sulfur caused leaf injury to nearly all of the plants. Cane, even where it was scorched by sulfur, made a comeback within 10 days. Pumice material, as it fell from the air on the foliage, had a shredding action similar to that of a severe hail storm. Where the fall was heavy, much bark was "sand blasted" from smaller trees.

The eruption destroyed 14 homes and put 3,000 acres of land out of production. Eight hundred were acres of cultivated crops. The remainder was in forest and pasture.

A major problem now is whether something can be done to aid in the return of the lava lands to economic use. Possibly, man may be able to expedite nature's weathering process on this lava. A first step may be the use of heavy rollers pulled by a large track-type tractor. This would provide more fine material for root development, and make the surface more readily accessible. By rolling, planting, and fertilizing, we might be able to make the use of the land in pasture, orchard, or woodland economically possible. Shortleaf ironwood (Casuarina equisetifolia) was to be one of the first trees to be planted on the lava after it has cooled. This may take up to 18 months, depending upon the lava's thickness.

Possibly, we may be able to aid in the return of these lava areas to economic use.

—ROBERT C. MALMGREN

SOIL CONSERVATION

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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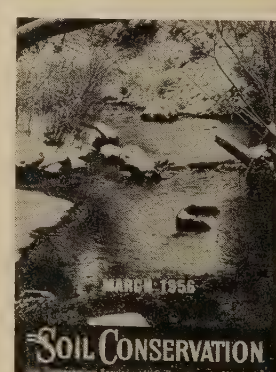
WHY WATER IS PRECIOUS.—Would you believe that every cutting of alfalfa requires about 326,000 gallons of water per acre to grow it? Or that an acre of cotton needs 800,000 gallons of water to mature one annual crop?

In other ways, too, our consumption of water is staggering: A large paper mill requires 50 million gallons of water per day—more than enough to supply the day's personal needs for a city of half a million. It takes from 600 to 1,000 times as much water as coal to operate a steam power generating plant. It takes 18 barrels of water to produce a barrel of oil, 25 gallons of water to produce a gallon of aviation gas, 250 tons of water to make a ton of steel or a ton of sulfate wood pulp. It takes 42 gallons of water to produce a pound of rubber, and 1,000 gallons of water are required to produce a pound of rayon. Finally, in the United States the average use of water per citizen—for industrial, personal, and other needs—is about 1,300 gallons daily—and the total is rising all the time.

Such facts show why farmers and urbanites alike are interested in protecting water resources and using water efficiently.



FRONT COVER.—The spring thaw at the headwaters of Salmon Falls Creek, Idaho releases much precious water to the people in the valleys below.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Peaches Prosper

By WAYNE D. JACKSON and FRED W. HERBERT

A building contractor retires to become an orchardist. By using common sense combined with past experience and with technical aid from his soil conservation district he rejuvenates an old peach orchard and makes it pay good dividends.

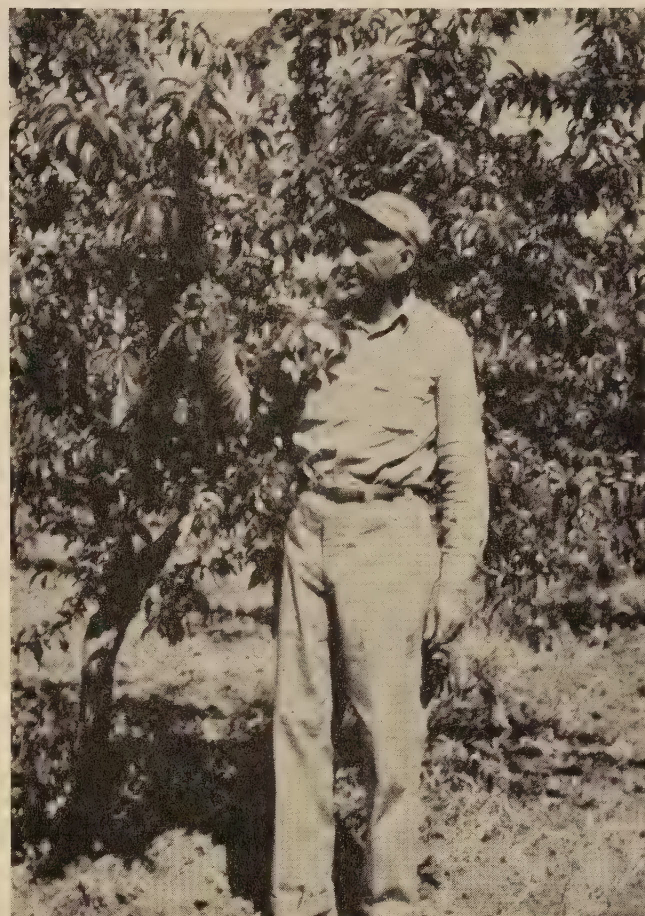
FRANK A. POIRIER was formerly a building contractor. In 1949 he retired and purchased 78 acres on the Horseshoe Bar Road, 3½ miles east of Loomis, Calif. The fact that he had not previously engaged in farming is "fortunate," he says, "because I had nothing to unlearn and no fixed notions."

Most of the 78 acres was in bad shape. Part was covered with native brush while some was very wet and covered with willows and wild berries. Production was much below the county average. The cultivated part was an orchard that contained 28 varieties of fruit trees, planted at random throughout the orchard.

While he had some ideas of his own, Poirier knew he needed help. He heard about the Placer County Soil Conservation District and applied to that district for assistance.

Through the district, a soil conservation survey was made of his acreage. The survey showed that most of the soil was light textured and from 36 to 60 inches deep, underlain with granite. The slopes were from 3 to 12 percent. Most of the land was Class II or III and had suffered considerable erosion. Some areas were too wet for fruit trees. He and the Soil Conservation Service technicians decided that peaches could be grown successfully with suitable soil conservation practices, especially adequate drainage and irrigation. As a newcomer to the farming business, the land capability survey showing the needs, limitations, and possibilities of his farm greatly impressed Poirier. He feels that this was fundamental to all his subsequent operations.

The first job for Poirier was to clear 23 acres of brush and wild berries, and to bulldoze out most of the old trees. Then he started to plant his new orchard. He had one strong conviction: That drainage was his No. 1 problem. Typical of his attitude and actions in all of his farming operations, he did a thorough drainage job. He installed 7,500 feet of closed tile drainpipe. This was laid so that much of the water drains into a sump at the lower end of the orchard to be pumped back onto the orchard for irrigation. Having arranged for thorough drainage, Poirier next planned to irrigate by sprinklers. In developing his sprinkler system, he experimented with methods of getting water under the trees. He finally decided this could best be done by placing the sprinklers low and properly angling the nozzles.



Frank Poirier admiring one of his 3-year old peach trees.

Note.—The authors, both with Soil Conservation Service, are respectively, work unit conservationist, Auburn, Calif. and assistant state conservationist, Berkeley, Calif.

Linda Poirier (left) and cousin Tina sample Elberta peaches.

Next came a planned system of cover cropping and fertilizing. He purchased a soil testing kit to determine the general level of fertility, particularly the needs for nitrogen and phosphorous. Early in his fertilizing program, he found that 39 pounds of nitrate per acre-foot of water was coming out in the drain water.

He finally settled on about one-third pound of actual nitrates per tree per year, to be increased as the trees grew larger. Superphosphate (19% P_2O_5) was applied at the rate of 200 pounds per acre to the cover crop. He also applied 500 pounds of lime per acre the second year. In 1955 the nitrate fertilizer was applied in three separate applications to help overcome the nitrate loss through the drainage water. He applied 1 pound of actual nitrate per tree. This was applied by using 1/3 pound of actual nitrate per tree using ammonium nitrate; another 1/3 pound per tree was applied in 30 days using Urea fertilizer. The last application was made 30 days later, using Urea. Then he decided to grow an annual cover crop of Canadian field peas and barley to supplement the commercial fertilizer, as well as to guard against erosion by winter rains and to improve the condition of the soil. He discs the cover crop into the upper layer of the soil at the end of the rainy season each spring.

Mr. Poirier is now experimenting with pruning. His idea is to not prune the pendulous branches that hang down to form the "skirt" of the tree. These are removed under the conventional pruning system. He feels that these branches provide an increased fruiting area that can be utilized if the trees are properly fertilized and irrigated. By proper thinning of the fruit, the weight of the fruit can be distributed without danger of breaking lateral branches.

In August of 1953, 2.3 tons of peaches were harvested from 2½-year-old trees. In 1954, 6.7 tons were harvested from 3½-year-old trees. In 1955, a late spring frost greatly reduced the "set" of fruit, but the orchard is in splendid condition and, in size, the trees appear to be twice their age. The possibilities of ultimate yields are indicated by the production from a three-acre block of old Elberta trees which Mr. Poirier left when the rest of the old orchard was dozed out. These trees have received the same treatment given the young orchard. They are averaging 18 tons of peaches per acre.

Fork lift pickup loads 1 ton, 42 boxes, of Elberta peaches on bank-out trailer.

Poirier has applied efficient methods learned in the contracting business in the harvest of his peach crop. He uses a bank-out trailer along with matts and a fork lift in bringing the peaches in from the field and stacking them to

Tractor tows trailer with 1 ton of peaches to shipping station.

await the arrival of large semitrailer trucks to transport the fruit to the canneries where they are sold.

Since his 1955 experience Poirier has laid in a supply of 5-gallon paint cans that he bought for 10 cents each, which he plans to use for smudge pots in the event of another frost.

Since it takes several years to make a producing orchard, most growers are, perhaps, unable to wipe out an entire old orchard and start over. The soil and water conservation principles and practices which Poirier used to secure top production, however, can be applied on smaller areas each year. By doing this with a coordinated soil and water conservation plan in mind, any farmer with comparable conditions can achieve much the same results.

Poirier's experience in the highly competitive contracting business, made him very receptive to the principles of conservation farming. He is carrying out these principles by conserving plant nutrients, in applying the right amounts of fertilizer, by draining the wet lands, protecting his sloping land against erosion by cover cropping, and conserving water by installing a system for impounding excess irrigation water for reapplication to the land. His whole farming operation is characterized by his placing primary emphasis on determining the needs of the trees, then applying the best known methods to supply those needs.

Water Spreading Pays Off

Nebraska ranchers find that ponds and water sperading structures conserve both water and soil and improve their ranges.

By A. RALPH GRENIER

IN the northwest corner of Nebraska there is an area known as the Gumbo, the soils being heavy clays developed from Pierre shales. Some of this land is in the Sugarloaf Soil Conservation District which was organized in April 1941. Before that the Federal Government had a submarginal land purchase program, the Pine Ridge Land Utilization Project. After the district was organized in 1941, the district board of supervisors took over the grazing management of the Government-owned lands. This land has since been used exclusively for grazing. The board of supervisors accepts grazing applications each spring and allots the grazing permits to eligible lessees. Although the U. S. Forest Service took over the management of the Government lands from the Soil Conservation Service in 1954, the Sugarloaf Soil Conservation District Board of Supervisors still has the responsibility for alloting grazing permits and collection of grazing fees.

At the time the district was organized in 1941, the main jobs confronting the board of supervisors were building dams for stock water to get better use of the rangelands and increasing the growth of hay for winter feed on the ranches.

There is practically no water available from wells either for livestock or human use. Most people catch rainwater from the roofs of their homes and run it into cisterns for human consumption. But supplying livestock water presented a different problem. Building properly

Note.—The author is work unit conservationist, Soil Conservation Service, Fort Robinson, Nebr.

Diversion canal to lead water to Henry and Mader ranches.

designed stock water dams of adequate size and at the right location seemed to be the only practical solution to this problem on both private and Government-owned lands. SCS technicians have designed, laid out, and supervised the construction of approximately 280 dams on private lands and 140 on Government-owned lands.

The problem of increasing winter feed supplies by raising more hay crops was almost as important as the livestock water problem. The annual precipitation is around 15 to 17 inches. This amount of moisture will grow good summer feed such as native grasses, but will seldom produce good hay crops such as alfalfa. The only feasible solution to this problem was to use flood runoff waters for the production of hay and feed crops. SCS technicians laid out water-spreading systems on suitable fields that had adequate runoff areas above them to make them function properly. Several large irrigation storage dams were built to catch floodwaters and irrigate lower-lying areas which had been allocated for hay production.

Water spreading proved to be one of the most popular mechanical practices installed in the district. These systems fall into three different types—wild flooding from contour ditches, contour dikes with drain gates to drain off excess water and prevent damage to hay, and controlled irrigation from storage dams.

One of the most extensive water-spreading systems was installed during the winter of 1953 and 1954 to irrigate more than 700 acres for hay production on the Mader and Henry ranches.

During the dry summer of 1953, Jerome and Merlin Mader kept thinking and talking about all the good water that went down Indian Creek during the spring runoff and heavy intermittent rains. They finally decided that maybe something could be done with the water. Indian Creek has a drainage area extending about 40 miles into Wyoming and South Dakota. Jerome operates the H. I. Mader ranch and Merlin operates the J. L. Henry ranch. These ranches are located about 40 miles northwest of Crawford, Nebr., on the Nebraska-South Dakota line.

The Mader ranch has had a conservation ranch plan with the Sugarloaf Soil Conservation District since 1943 and during the period two large storage dams were built on dry draws for irrigation. These dams are near each other and the overflow trickle ditch from the larger dam empties into the smaller dam. These two dams impound 250 acre feet of storage. During the recent dry years, however, these dams have not been filling to capacity.

The Henry ranch has had a conservation ranch plan with the Sugarloaf Soil Conservation District since 1942. It has an inadequate

Concrete control structure where water is derived from Indian Creek.

storage system consisting of two reservoirs which occasionally were filled from runoff coming down from dry draws. Even in the years that these reservoirs filled there was insufficient water to irrigate all the nearly level land below which Henry owns.

In August 1953, Jerome and Merlin decided to see what the Soil Conservation District and SCS technicians could do to help solve their water problems.

A preliminary survey to determine the feasibility of placing additional land under a water-spreading system was made by A. Ralph Grenier and John Mader of the local SCS office. A feasible solution and plan were worked out.

The completion of this project is an example of cooperation and hard work put together by the 2 landowners, 2 tenants, their local Soil Conservation District, and the SCS technicians.

After a number of meetings of landowners, their tenants, and the SCS technicians and the development of a pooling agreement through the Agricultural Conservation Program, a management and operations plan was agreed upon by the landowners. The SCS engineer completed the design for the project and the local SCS technicians staked and supervised construction of the project.

A contract was let for the major earth moving jobs. Work began on November 10, 1953, and was completed on February 26, 1954.

The project consisted of building a $4\frac{1}{2}$-mile long ditch which is 10 feet wide at the bottom and varies in depth from 2 to 24 feet. This involved moving approximately 85,000 cubic yards of dirt.

This ditch takes water from Indian Creek through a concrete control structure 6 feet high and 10 feet wide placed in the diversion canal. The canal has a capacity of 36 second-feet.

Contractor Emil Kilber of Chadron, Nebr., did the dirt moving job and the Maders and Henry and son, Gail, laid 196 feet of 24-inch concrete pipe for road crossings, lateral turnouts, and a let down structure. In addition they used 200 feet of 12-inch concrete pipe for outlets and turnouts. All outlets are gated. A number of the outlets were placed so as to also serve the purpose of silt removal. Fourteen cubic yards of concrete were poured in the inlet structure.

The ditch spreads water on approximately

J. L. Henry (left) and H. I. Mader congratulating each other on completion of their joint water diversion and water spreading project.

300 acres of the J. L. Henry ranch and 36 acres on the H. I. Mader ranch before the ditch empties into 2 storage dams on the Mader ranch.

Some of the land on both ranches is being leveled and bordered. The nearly level heavy soils are contour diked and flooded. The steeper areas are contour flooded with corrugations for more uniform spread of the water.

Alfalfa is used for the main hay crop and is also drilled into the sod where the land is not leveled and bordered. When irrigation water is applied, the native short grasses, cactus, and sagebrush fade out and the vegetation becomes principally western wheatgrass and green needlegrass along with the alfalfa. The areas in alfalfa before the development of this project were yielding around 1 ton to the acre. In 1955 the first cutting of hay made 2 tons or better.

Henry and Mader always wondered if this type of project could be developed when they were operating these ranches. They have both said since completing the project that it is wonderful to be able to use more of the water that flows down Indian Creek when the creek is up.

This project has been watched closely by other landowners in the district. There is now another project of a similar type being contemplated for development in the near future.

LOANS UNDERWAY.—During the first 7 months of the Farmers Home Administration's new soil and water conservation program, 2,195 farmers and ranchers borrowed $11,881,000 to improve soil and water resources.

A Look at Erosion Under Furrow Irrigation

No. 13

This is the thirteenth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By STEPHEN J. MECH

EROSION control is basic to sustained production. Keep the soil in place and the problem of maintaining its productivity will be greatly simplified. In other words, it is easier to make a living on a farm with 14 inches of topsoil than on one where 8 have been washed away and only 6 remain. The deeper soil should produce higher yields with less effort and expense. It is easier to plow and requires less water to irrigate. It should require less fertilizer, and be easier to cultivate. The only increased cost should be that of harvesting the greater yield, but no one objects to harvesting large crops.

Higher yields per acre rather than increased acreages are primarily responsible for America's record crop production in recent years. Our declining acreage of agricultural land and the accompanying increased production per acre have emphasized the importance of better farming methods. We have more efficient farm machinery, more effective fertilizers and insecticides, as well as improved varieties of seeds and better land use.

It is easy to attribute our record crop production to any one of the above factors. Yet those who have made careful study of the maintenance of our soil productivity conclude that over a long period, soil erosion is a more troublesome problem than soil exhaustion by depletion of fertility. It is quite obvious that the soil body itself must be maintained to get maximum benefits from the better farming practices, the efficient farm machinery, effective fertilizers, improved varieties, and so on.

Water and soil fertility are usually thought of as renewable resources; but the topsoil is only slowly renewable and, in certain cases, it is practically impossible to restore. Fertililty of the soil may be high one year and low the next. It can be modified almost at will. Our water supply may fluctuate: If it be short one year heavy precipitation the next year may renew the supply. In general the depth of the topsoil, however, is altered only in one direction—downward. Once the soil is lost it can only be regained by slow and costly processes.

Obviously we must utilize the soil for crop production. Economic considerations require also that we often use it for maximum production. But we must use it in a manner that will not destroy it. If the soil is gone the effective-

Erosion at the upper end and depositions at the lower end of irrigated furrows.

Note.—The author is irrigation engineer, soil and water conservation research branch, Agricultural Research Service, U. S. Department of Agriculture, Prosser, Wash.

This gully was caused by excess tail-water from furrow-irrigated field above.

ness of many improved practices is greatly reduced and crop production becomes increasingly difficult.

There is a growing recognition that soil erosion on irrigated land is a menace to the permanence of irrigation agriculture. Dr. Israelsen in an address to the Utah State Agricultural faculty said, ". . . the permanence of agriculture in the arid regions depends vitally on more complete development of irrigation science in relation to erosion control on irrigated lands and to the solution of the alkali problem by more intelligent irrigation and drainage practice . . ."

Every acre that goes out of production means that to some degree the pressure is increased on the remaining good acres. Its production, its share of the highway, school, church, and other obligations, as well as the farm overhead must then be assumed by the remaining productive acres.

Wherever water is flowing over cultivated land it will cause erosion. If all the rainfall could be absorbed near the point where it falls there would be no runoff and no erosion. Under rainfall conditions, every effort that increases infiltration, increases the amount of rain that enters the soil, produces less runoff, and causes less erosion.

Under furrow irrigation, however, heavy erosion can take place on the upper end of an irrigation field even though there is no runoff or soil loss from the bottom. The irrigation furrow is used as a canal to deliver water to each square foot of area down the slope. The first foot of a 400-foot furrow is used as a canal to conduct at least the minimum amount of water necessary to irrigate the 399 feet below it. The point 99 feet downslope is conducting enough water to at least satisfy the thirst of the remaining 301 feet of length.

The amount of water is largest at the upper end of the run and becomes progressively less as each foot of soil absorbs its portion. Because the furrow is used as a channel for transporting water to the soil area along its length, erosion under furrow irrigation cannot be eliminated. The best we can do is reduce it to a minimum.

It is reasonable to expect that the intake need or absorption by a 400-foot furrow may change. For example, if the soil has a low absorption rate, a small amount of water applied at the top may be sufficient to irrigate the entire length. But if the "absorption" or intake of the soil is doubled, it will require more water to satisfy this greater requirement. If the rate of water application is unchanged it will be sufficient to irrigate only 200 feet. It

is obvious that the rate applied must be doubled before the entire length of the furrow is irrigated.

It is inherent in furrow irrigation that the upper part of the furrow act as a channel to supply the water required by the rest of the run. There is no satisfactory way of avoiding greater flow on the upper ends of irrigation furrows. Whether the flow required is due to a lengthening of the run or an increase in infiltration or both, does not change this fact. The water must be delivered at a rate high enough to satisfy the total infiltration demand. This means that the total infiltration rate of the entire furrow is the limiting factor below which the irrigating head cannot be satisfactorily reduced.

It is generally admitted that decreasing the flow of water will decrease erosion. Conversely, increasing the flow will increase erosion. Whether the increased flow is deliberate or accidental is immaterial. This is an unfortunate combination of circumstances because the usual good farming practices such as rotations, contouring, adding of organic matter, and other soil improving practices generally increase infiltration and thus indirectly increase the erosion hazard under furrow irrigation.

The amount of erosion depends on the rate of flow, the slope, the soil condition, crop cover, and other factors. An irrigation farmer has a certain amount of control over these things. By exercising this control properly, he can reduce erosion to a minimum.

Look at the upper end of your irrigated fields to see how much erosion is occurring on your farm. There is probably a dip in the surface not far from the head ditch or pipeline—just about where cultivation begins. This dip is usually caused by the removal of soil from this point by the water flowing in the irrigation furrows. Such losses amounting to as much as the removal of 12 inches of topsoil have been found on many relatively flat fields with short runs after about 10 years of cultivation.

Fields that show erosion at the upper end usually show sedimentation at the lower end. This gradual accumulation of soil at the lower end is caused by the deposition that takes place as the silt-laden water is absorbed into the soil. The amount of deposition reflects the amount of erosion on the upper part of the field.

Test plots for measuring erosion and flow 300, 600, and 900 feet from head ditch.

The nature of the erosion problem under irrigation may be illustrated by the following measurements made along a 900 foot irrigation furrow on a grade of 2 percent. Clear water was applied at a rate of 7 gallons per minute at the upper end of the furrow. Three hundred feet down the grade, the flow dropped to 4.5 gallons and carried a total of 176 pounds of soil past this point during the irrigation period. At a point 600 feet from the top the flow dropped to 1.9 gallons and the soil carried past the point dropped to 13 pounds. At the bottom end it dropped to 0.7 gallons a minute and only 1 pound of soil was lost from the 900-foot furrow during the entire irrgiation.

It took only 48 minutes for the water to travel the first 300 feet. It reached the 600 foot point in 3 hours and 31 minutes. It got through the entire 900 feet in 11 hours and 22 minutes. In actual practice a larger flow should be applied so that it would get through in about one fourth of the total duration of irrigation.

It seems that for similar soil and furrow conditions a flow of 4.5 gallons per minute would transport a total of 116 pounds of soil, and a flow of 1.9 gallons would carry 13 pounds regardless of what happened to the water afterwards. Whether the 4.5 gallons was used to irrigate 1,000 feet of furrow, or was entirely consumed in 100 feet, or was dropped into a waste ditch, it would still have the ability to pick up and carry away 116 pounds of soil from the area it has flowed over.

It is interesting to note that considering the 900-foot test as a whole both the runoff and the soil loss were negligible. The 0.7 gallon per minute runoff continued for only 5 hours and the entire 900-foot furrow lost only 1 pound of soil during this irrigation, yet when we look along the entire length we see that parts are subjected to severe runoff and erosion.

It becomes apparent also that erosion measurements at the bottom end furnish little information about what is occurring up the slope. The upper third of this run, for example, was irrigated with a runoff of 61 percent and lost 116 pounds of soil from each furrow.

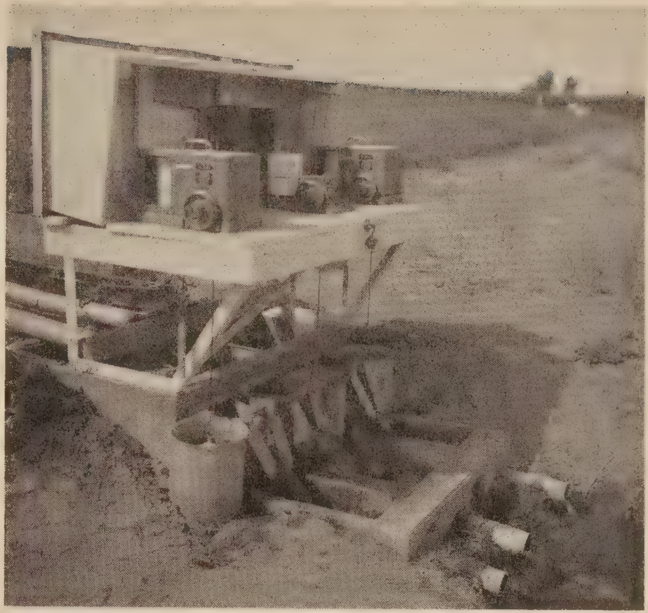
Though the application rate cannot be reduced to less than the infiltration rate of a furrow, considerable saving of soil and water can be accomplished by positive means of controlling the irrigation head such as gates and valves controlling the application to the individual furrows. Measurements on various farms have shown that in many cases as much as 70 percent of the applied water is wasted from the field. This waste water contributes nothing toward more effective irrigation. It merely moves more soil out of the furrow and may aggravate silting and drainage problems.

Cultivation and other means of stirring the soil are by far the greatest single causes of erosion. First-year alfalfa, on a 7 percent slope irrigated immediately after reditching lost 477 pounds of soil per furrow. The next irrigation, made without cultivating the furrows but using approximately the same flow, lost only 52 pounds. Third-year alfalfa on the same slope lost 250 pounds and 24 pounds for the disturbed and undisturbed furrows respectively.

The same is true in row crops. Corn lost 450 pounds of soil during the irrigation just after the last cultivation, but the following irrigation in the same furrows, untouched by tillage implements, lost only 77 pounds. The possible use of chemicals and flame for weed control has much potential value for erosion control if their use would reduce the number of required cultivations.

Vegetation in the furrow itself will hold the soil and reduce soil movement. For most effective control irrigation furrows should remain undisturbed for as long a time as possible. It is in the furrow, where the soil and flowing water contact each other, that the protection is necessary. Reditching not only loosens the soil but usually decreases the amount of vegetation at the point where it is most necessary. The condition of the area between furrows has practically no effect on the amount of erosion because it is out of reach of the flowing water.

A slight change in the cultivation schedule may reduce erosion. It is a common practice to cultivate and ditch just before irrigation. Under such conditions the irrigation water is applied in a furrow where the soil is loose and detached—a condition most susceptible to erosion. It also helps the newly disturbed weeds.



Recording machine to measure water applied and runoff from irrigation plots.

It should be much better to cultivate and ditch as far ahead of the next irrigation as possible. The disturbed weeds would be without water for quite some time and most would die. By the time of the next irrigation, the loose detached soil will have had time to settle and "firm-up." During this interval the morning dews, the showers, and even time itself tend to build up some resistance to erosion.

Erosion takes place early in the irrigation. On slopes above 2 percent practically all of the erosion takes place within 3 to 4 hours after runoff begins. If water flows for 3 to 4 hours it will in that time cause practically all the erosion damage that occurs during the entire irrigation. Permitting this stream to run on for two more days would add very little to the total erosion damage. It would, of course, affect the irrigation efficiency and aggravate the runoff and drainage problems. For example: In one experiment, corn had a total soil loss of 22.7 tons per acre during a 24-hour irrigation, but 17.3 tons of soil eroded during the first 32 minutes of flow, and all of the loss took place within 4 hours. Irrigation after the fourth hour added practically nothing to the total ero-

(Continued on page 192)

Snow Surveys Made By

By R. N. IRVING

MANY ranchers and irrigators living in the Twin Falls (Idaho) Soil Conservation District know their high mountainous water producing areas in detail. They go there almost every fall to hunt deer and sagehens, they fish there in the spring, and they go there just to observe the condition of the grass and the soil. With the knowledge that these men have of their watershed, it is not surprising that they should seek help in the scientific evaluation of the snow that falls each year and the moisture status of the soil beneath it. In this way they obtain a more accurate forecast of probable water supply for the next irrigation season.

Most of those who irrigate the lowlands and graze the mountains realize the vast territory included in the watersheds of the three irrigated areas of the Twin Falls Soil Conservation District. To the west lies the Roseworth tract with a watershed of more than 125 square miles. Cedar Creek drains this area and supplies water to Cedar Mesa Reservoir which irrigates about 5,000 acres across the canyon from Castleford, Idaho. Historic Rock Creek to the east drains almost 100 square miles from the top of the Minidoka Mountains to the Snake River below.

Lying between these is the Salmon Falls tract, which is bisected by Salmon Falls Creek with its vertical lava-walled canyon, a natural barrier and one of nature's beauty spots. Recognizing no manmade state or county lines, the Salmon Falls Creek watershed reaches 9,000 feet at the top of Elk Mountain in Nevada, some 50 miles from its confluence with the Snake River 5,500 feet lower. This vast area of nearly 1,500 square miles is nature's reservoir for the snow and rain that eventually reaches the 35,000 irrigated acres of 350 farms in the valley.

Snow surveyors must travel 35 miles to the top of Magic Mountain or Deadline Ridge and more than 100 miles to Bear Creek Meadows to measure the snow courses. Usually 5 days are required the first of each month to make snow surveys for the 3 irrigated areas. They travel 370 miles by truck hauling the snow-cat, 80 miles up the mountain by snow-cat, and ski 13 more miles to the top to make snow water content and soil moisture measurements. As winter progresses, the colder weather, deteriorating road conditions, and deeper snow force them to leave the truck lower and lower on the watershed and the distances traveled by snow-cat and on skis increases.

At the request of ranchers and irrigators, the Twin Falls Soil Conservation District, and The Salmon River Canal Company, snow courses and soil moisture measuring stations were installed in the high mountains surrounding Salmon Falls Creek by the Soil Conservation Service and cooperators of the district. A net work of such courses not located within this drainage had previously provided basic data for forecasts on Salmon Falls Creek. These surveys were accurate enough for general planning, but left a great deal to be desired in the accuracy needed for detailed farm and ranch planning in Salmon Falls tract.

Individual irrigators in the area who have a sporting instinct and rugged physiques, such as Glenn Nelson, John Pastoor, Lee Bitzenburg, Eldred Taylor, Ellis Fuller, Bob Leichliter, Truman Clark, Ralph Schnell, and Elmer Farrar volunteered to take up the work of establishing the snow courses and helping make the snow surveys. These men do their work without pay or other forms of compensation, except that they get great satisfaction from doing a job they think should be done and they get information that is valuable to them in planning their farm or ranch operations for the coming season.

In July of 1954 these men along with technicians of the Soil Conservation Service established five snow courses, strategically located within the drainage area. A reconnaissance was made to determine the exact location of snow courses which would give the most consistent evaluation of each year's snow pack. Once the snow courses had been established, soil moisture units to determine the moisture content

Note.—The authors are, respectively, state conservationist and snow survey leader, Soil Conservation Service, Boise, Idaho.

nd For the Water Users

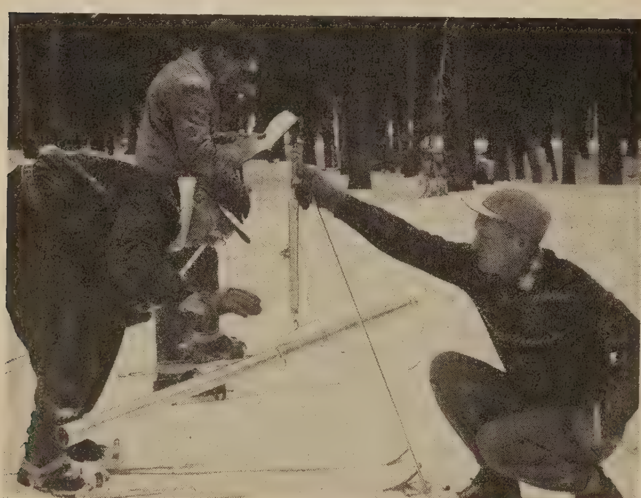
M. W. NELSON

of the soil beneath the snow pack were established to give more accurate data.

The soil moisture measuring units were fiber glass electrodes placed at various depths, from 6 inches to 6 feet, in undisturbed soil with wires from each unit leading through a pipe to an elevation above expected snow accumulation. The moisture in the soil is measured with a modi-

Snow surveyors of the Twin Falls Soil Conservation District measure soil moisture with an ohmmeter, (left to right) John Pastoor, Ellis Fuller, Glen Nelson, Walt Hankins.

Measuring the snow on Salmon Falls Creek watersheds: (above) taking a sample (below) weighing the snow to determine its water content.



fied ohmmeter which is attached to the lead wires.

In the winter of 1954 Walter Hankins of the Soil Conservation Service attended the Snow Surveyors' School at McCall, Idaho, for training in the precise techniques of snow surveying. When Walt returned to the Twin Falls Soil Conservation District, he was prepared to give his fellow snow surveyors scientific assistance in making accurate measurements of snow depth, water content, and moisture status of the soil.

The data gathered by these men have played a significant part in the land use planning of irrigators on the Salmon Falls tract for the last 2 years. In 1954 a water supply forecast meeting was held in April. Technicians of the Soil Conservation Service presented an interpretation of the snow survey measurements to cooperators in the Twin Falls Soil Conservation District. The snow pack was lower than had ever been recorded in the 17 years of snow measurement. The forecast predicted a low water supply for the year. The data were presented in graph form so that farmers could make their own interpretation without following the technical procedure of the multiple regression equation.

It is interesting to note that some farmers, after the meeting, came up and stated that they felt the Soil Conservation Service forecast was too high in view of the low snow pack. This proved to be the case. One of the lowest flows ever recorded on Salmon Falls Creek followed.

Many farmers prepared for this low water year by temporarily changing their land use. They cut the acreages of irrigated crops so they could concentrate the available water on bringing to maturity the crops they were going to plant. However, since this was the first year of water supply forecast made in public meetings, there were some who did not make such an interpretation.

In 1955 the same cooperative snow surveys were made on the watershed, but included 5 new snow courses and 3 new soil moisture stations. A unique situation developed. The snow pack at low elevation was unusually heavy but the fiber glass electrodes lying beneath the snow in the soil indicated the soils were extremely dry, so dry that the soil could absorb the entire snow pack without allowing water to run into the streams. There was considerable discussion on the effect of this heavy snow pack at the low elevations.

A water supply forcast meeting was called by Bill Loughmiller, chairman of the Twin Falls Soil Conservation District board of supervisors, to discuss the situation for the 1955 season. Practically every resident in the Salmon Falls tract was represented at this meeting. Again an interpretation was made by the technicians of the Soil Conservation Service on the possibility of water for 1955. The forecast indicated that the snow pack would not contribute to streamflow because of the dry soil beneath it. While there was more than 2 feet of snow, carrying between 5 and 7 inches of water, the electrodes indicated that the dry soil would

absorb that much water.

The snow pack high in the mountains indicated a near normal snow cover, but again the electrodes indicated a very dry soil—soil that was dry for the second year in a row. An extremely low forecast was made for the coming summer. This time many operators within the district took drastic plans to conserve the short water supply available. Local technicians of the Service explained the many methods of conserving water on the farm. It is well known however, among the irrigators of southern Idaho that the farmers on the Salmon Falls tract make efficient use of their water every year and hence can make only small water savings by more economical use.

Carroll H. Dwyer and Vernon W. Baker, economists of the SCS at Porland, Oreg. recently completed a survey of the amount of work and money saved through the forecasts of 1955. Their survey brought out the following points:

The Salmon Falls tract contains about 70,000 acres which could be irrigated if adequate supplies were available. The available water supply fluctuates markedly however, from year to year depending upon the snow pack. The acreage actually irrigated varies from about 10,000 acres to 35,000 acres depending upon the watershed yield.

Heavy snows fell in the foothills in 1955 and March precipitation was 183 percent of normal. Visual evidence of hills covered by snow indicated to some people a good water supply, possibly adequate for about 25,000 acres. Lacking the water supply forecasts the farm operators would probably have prepared, pre-irrigated, and seeded the usual acreage. However, the water supply forecast based on snow surveys in the water-producing high mountains of the tract indicated runoff of only 60 percent of normal. Accordingly the farm operators reduced their anticipated acreage by more than one half.

In addition, the types and percentages of various crops planted were substantially different from those which would have been planted under a normal water supply. Crops requiring a late season water supply, such as alfalfa, or irrigated pasture were materially reduced or not planted at all.

The savings in farm operations resulting from not preparing the land and planting crops were estimated as follows:

Concrete-lined irrigation ditch of the Salmon River Canal Company.

Beans	$106,050
Small Grains	91,800
Hay or Pasture	101,550
	$299,400

Since these crops were not planted, there was a saving of approximately 6,600 acre-feet of water due to the fact that pre-irrigation of the anticipated crops was not done. This saved-water was used to supplement irrigation of land actually irrigated. Using average figures this water would normally produce a net income of $79,450.

In summation, the economic benefits which are readily evaluated in monetary terms for the Salmon Falls tract as a result of practical water supply forecasting in 1955 are estimated conservatively to be:

Expenses not incurred	$299,400
Increase in net income from saved water	79,450
Total benefits	$378,850

In addition to the monetary savings of the year, a good deal of land was left in productive covering and not prepared for seeding because there was no water available. This land was, therefore, not subject to wind and sheet erosion as it might have been if prepared for crop and allowed to go idle. These intangible benefits cannot be computed; nonetheless, they are very real.

In the future it seems that this high degree of cooperation between farm and range operators in the Twin Falls Soil Conservation District and local technicians of the Service will result in more efficient conservation and use of soil and water resources. The techniques of planning and cooperation developed in this area may well assist others in a similar situation throughout the Western States.

SNOW SURVEYORS AT WORK

(Excerpts from the reports of Walter C. Hankins, soil conservation aid, Soil Conservation Service, Twin Falls, Idaho.)

ON our March 1, 1955, measurements, John Pastoor, supervisor for the Twin Falls Soil Conservation District; Ellis Fuller, Twin Falls Soil Conservation District cooperator; and I left Twin Falls at 7 a.m. We planned to haul the M–7 snow-cat as far as Cherry Creek School, unload it, and drive the snow-cat to Pole Creek Goat Creek, and Hummingbird Springs snow courses—all of which are located along a ridge. Pole Creek is 18 miles south of Cherry Creek School and Hummingbird Springs 6 miles further south, with Goat Creek lying between.

We ran into difficulty shortly after reaching Roseworth Reservoir, which was still 22 miles short of Cherry Creek School. There was a cold, strong wind blowing and the road was practically drifted shut. After much shoveling, sweating, and swearing, however, we got the truck 10 miles farther, to Roland Patrick's ranch.

After talking with Mr. Patrick, we decided to unload the snow-cat and use it the rest of the way. We took our bed rolls, skis and poles, grub, parkas, sampling equipment, and everything else that makes a snow surveyor's existence possible, from the truck and tied them on the snow-cat.

In the meantime Mrs. Patrick prepared a delicious hot dinner for us. After eating, we started out, the M–7 looking more like a prospector's burro than an up-to-date over-the-snow machine.

We were glad we left the truck behind because the going got continually worse with great drifts in the road. However, there were patches, sometimes up to one-fourth of a mile, of bare ground and it was over these that the snow-cat had the most difficulty. The M–7 lacks several things, one of which is springs. Every rock it goes over makes itself known by a series of jolts, enough to jar one's backbone from one end to the other. We kept to the snow as much as possible but frequently there was nothing to do but to ride over the rocks.

Eventually we reached Cherry Creek School, left the main road and after a time reached

Walt Hankins

Pole Creek Ranger Station. At this point we decided to unload our bed rolls and most of the grub, and leave these at the station. It was not that we didn't trust the snow-cat, but it had developed a decided squeak in the left final drive bearing and the continuous jolting had caused the radiator to start leaking slightly. We thought that if the snow-cat quit on us, we could ski back to the station and be more comfortable. The going was better then. There was snow consistently enough that two of us could hang onto ropes and ski behind the snow-cat while the other man drove. The wind was getting steadily stronger, however, and it was cold.

We continued up the ridge, sometimes in timber and sometimes in the open. Our elevation was around 9,000 feet. We reached a point nearly even with and one-half mile away from the Goat Creek snow course. The snow there in the timber was fluffy and soft. Apparently it had not melted all winter, and the M–7 began sinking and wallowing along. Finally it stopped, having pushed enough snow in front of it with the front axle that it appeared unreasonable to try to make it go any further.

We took off on skis from this point just as the sun was sinking behind the Jarbidge Moun-

tains. We skied down to the Goat Creek snow course, measured it, then skied another 1½ miles to Hummingbird Springs and measured the snow there by flashlight.

After a 500-foot climb back to the ridgetop we returned to the snow-cat in darkness. The wind was getting stronger and was picking up snow and whipping it into new drifts. We started the snow-cat, shoveled enough snow that it could turn around, and started the return trip to Pole Creek Ranger Station.

After we left the timber and were driving along in the open, the situation did not look too pleasant. The wind had completely obliterated our tracks made on the way up and was whipping the snow to where visibility was cut to 50 feet or less. The M–7 is equipped with headlights, but when all you can see looking out the 18-inch square windshield is solid, glaring white, lights don't help much. It is easy enough to follow a ridge up hill but following a ridge downhill with secondary ridges branching off is a different story. To make matters more interesting, the left final drive bearing stopped squeaking and started howling. The cooling solution in the radiator became so low that the temperature gage began to register around 220°. When it reached the danger point, we shut off the engine, and sat there in the howling wind and opened some canned meat and ate lunch.

After some discussion and after the radiator cooled down, we decided to feel our way along the ridgetop, which we hoped was the right one. The snow-cat traveled for about 10 minutes and the radiator heated up again so we stopped again. As we sat there in the dark wondering whether to pull down off the ridge and try to find a sheltered place to spend the night, the wind let up momentarily and we were able to make out a group of coniferous trees shaped in such a way that we could recognize them as a point near a line fence which ran quite near to Pole Creek Ranger Station. After the engine cooled again, we made our way to this fence, and from there on into Pole Creek Ranger Station we had no further trouble except to stop occasionally to let the engine cool off.

As soon as we were in the Ranger Station we made a good fire, and before long enjoyed a hot supper. Early the next morning we measured the snow at the Pole Creek snow course, took the readings from the fiber glass electrode moisture units, and started the return trip to Cherry Creek School. From there we traveled west 14 miles to Kitty's Hot Hole, and then south 16 miles to Jarbidge, Nev. We then went 4 miles farther to the Fox Creek snow course and measured it. Since it was getting dark, we returned to Jarbidge and spent the night. The next day we drove the snow-cat 4 miles toward the Bear Creek snow course, skied 3 miles to reach it, measured the snow, and started back to Patrick's ranch where we had left the truck. We reached the ranch about 6 p.m. and loaded the snow-cat onto the truck. Having measured snow at all the snow courses in that end of our area, we then headed the truck back to Twin Falls.

> The snow surveyors of the Twin Falls Soil Conservation District reported that their January 1956 survey showed greatly improved moisture conditions over those of the previous 2 years. Soil moisture was excellent over most of the watershed. Surface snow averaged 38 inches in depth with a water content of 11 inches, while the snow averaged only 3.2 inches of water in 1955.

During these 3 days we had driven the snow-cat about 148 miles over the most miserable type of terrain and in addition had skied 10 miles. The important thing, however, was that we had measured the snow at the 5 established snow courses, on schedule, and without serious damage to the M–7 snow-cat.

On January 31, 1955, at 6 p.m. John Pastoor, Twin Falls Soil Conservation District supervisor, Hal Cox, district forest ranger for the Humbolt National Forest, and I left Kitty's Hot Hole planning to spend the night at Mahoney Ranger Station. Normally this is about an hour's drive—16 miles up the Jarbidge River Canyon.

There was only 2 inches of snow at Kitty's Hot Hole, but before long we were bucking 10 inches of heavy wet snow. We reached Mahoney Ranger Station at 10 p.m. and were more than pleased to have a comfortable cabin in which to spend the night.

(Continued on page 189)

The Farmer and Wildlife Management

A preliminary, nontechnical report on the findings, to date, on the Patuxent Research Refuge for wildlife management.

By FRED H. DALE

I ONCE asked a game technician in one of our progressive states, "Do you know how to manage land to produce more rabbits?"

"Yes," he replied, "but it's more profitable to farm."

I think this answer tells much about our way of thinking of wildlife on the farm. I believe the average farmer is a friend of wildlife. Many farmers go so far as to leave a row or two of corn unharvested as food for birds; others enjoy hunting or take pride in playing host to friends during the hunting season; and practically all farmers enjoy the whistle of a bobwhite, the song of a thrush, or the flash of a cardinal. The problem to many of them is, "How can I have more wildlife on my farm and still make a living as a farmer?"

The Fish and Wildlife Service and the Soil Conservation Service are both interested in this problem. The Fish and Wildlife Service realizes that more than 75 percent of small game animals shot in this country are produced on farmland, and that many of our migratory birds are farm residents; technicians of the Soil Conservation Service have nearly always tried to provide for wildlife in farm plans while advising farmers how to realize the most from management of the soil. Because of the interest of these two agencies, a research project was set up in 1947 at the Patuxent Research Refuge, near Laurel, Md., to try to find some needed answers.

The Fish and Wildlife Service furnished the land, labor for farming, and biologists to carry on the study. The Soil Conservation Service helped lay out the project, made conservation plans for both the conservation farm and the check area, and provided much of the planting materials. As the study has gone on, officials of SCS have visited the farms, advised about new problems, and used the area at times as a training site for farm planners.

Woods-field border on Patuxent demonstration farm.

From the start we projected our studies on the basis that there are probably three levels of wildlife management on which more facts are needed. First, there is the type that is good farming, aside from any effect it may have on wildlife. For example, if farmer Smith finds that a multiflora rose hedge will work better around a contour field boundary and will stay stock proof for a longer time than a wire fence, and that it helps reduce loss of soil moisture while serving as a windbreak, then he may be just as interested in the fence for good farming as for wildlife management. Contour hedges to mark field borders, woods-field borders to help hold back the spread of woods onto cultivated fields, and patches of cover that check erosion, all are good farm practices that might pay some extra dividends for wildlife.

The second level may be questioned by many farmers. Most of them, especially the best tillers of the soil, hate weeds. Every roadside, fence row, or small waste area on the farm is likely to be mowed or burned regularly to prevent weeds from getting started and spreading

Note.—The author is a biologist, U. S. Fish and Wildlife Service, Patuxent Research Refuge, Laurel, Md.

into cultivated fields. We know the farmer has a weed problem, but we also know that many wild creatures depend on weeds and other herbaceous plants for food and cover. We wondered whether there might not be some way to control weeds that would serve both good farming and wildlife management. Consequently, management of waste areas has been an important part of the study at Patuxent.

The third level of wildlife management studied is that which may actually decrease total farm income to a limited extent and will interest only a minority of farmers. Yet there are many farmers who like wildlife enough to want to do something more than good farming to encourage it. We often receive letters from farmers who want to know what can be done to increase quail, pheasants, rabbits, or songbirds on the farm. Many are from men who can afford to forego some of the productiveness of their land, if necessary, to encourage wildlife. As Federal agencies, we need to know how to advise such men, and should be able to say with some certainty what any given practice is likely to cost, and what wildlife responses may be expected. This part of the program is the last to be tried. As a matter of fact, we are still at the planning stage on many parts of it.

It should not be surprising that results on these studies have come slowly. The almost unbelievable speedup in industry in the last few years makes it hard for some of us to realize that most farm problems still come and go at a relatively slow pace. Man is in a hurry, but Mother Nature takes her time. It takes about 5 years to produce a multiflora rose fence that will turn livestock. After the fence is grown, several more years are needed to find out whether it will make a good fence, whether it will do anything for wildlife, and whether it will spread as a weed.

In spite of delays, waiting for nature, there have been some results that can be passed along now. This report is issued for three principal reasons: First, to advise farmers and technicians that such a study is being made; second, to report some promising results that make us believe we can help both farming and wildlife management on the farm; and, third, to point up some of the most important problems. We believe that many of our worst problems can be solved, once we learn to ask the right questions about them.

The conservation unit at Patuxent is laid out as a model farm. Probably no privately owned farm in Eastern United States demonstrates so completely the practices recommended by the Soil Conservation Service for soil and water conservation. Pastures have been improved by seeding to fescue and ladino clover, and by fertilizing; fences are of multiflora rose; contours are marked by hedges; woods-field borders are planted to shrub lespedezas; and water is drained off the slopes along sodded diversion terraces. Several planting materials are being tested along the contour hedges.

A check, or control unit set up for comparison, is farmed without much thought for either wildlife or soil conservation. This unit has wire fences, unimproved pastures, fields in large

Roadside cover and multiflora rose hedge on the Patuxent demonstration farm.

blocks, and in it there is no attempt to improve cover around field edges. Both units are managed on a 3-year rotation (corn, wheat, and hay) ; both are fertilized. However, we have been a bit more generous with fertilizer on the conservation farm than on the control.

As developments progressed, wildlife populations have been studied on both units. Songbirds and bobwhite quail have been counted each year. Rabbits, woodchucks, and other mammals about that size have been studied by live-trapping and marking with numbered tags. Even the small mammals such as mice and shrews have been trapped, given numbers, and released for further study. In this way we have been able to keep pretty close tab on what has happened to wildlife on the two units.

These two experimental farms are submarginal in soil resources. In Colonial days they were productive tobacco plantations, but as in many other areas along the Atlantic seaboard, so much of their original fertility was lost that they had been virtually abandoned as farms. From what we know of wildlife and soil fertility, we believe it will be hard to get best results from wildlife management measures on such depleted soils. Consequently, any favorable results probably would be magnified in good farming areas.

One discouraging feature of the first 5 or 6 years was the fact that the rabbits didn't seem to recognize what we were doing for them. We were able to take visitors over the farms and point out good patches of cover, beautiful living fences, well-growing hedges, in fact just about everything but rabbits! True, the conservation farm had more rabbits than the control unit, but not enough to make a farmer who had spent time and money developing it feel that he had made a good investment in terms of rabbit management.

During the first few years we followed the practice, common in many parts of the country, of mowing weeds in the fall, clipping all roadsides, and generally trying to keep the farm neat in appearance. We could see that this might result in too little cover for wildlife. Also, several packs of wild dogs roamed over the refuge night after night, and a heavy population of foxes hunted the fields. On winter mornings, dog and fox tracks were almost everywhere in the snow. With such a condition, it seemed that if predators could hold down a wildlife population anywhere, this would be the place. Then, as a third factor, many of the wildlife management plantings on the conservation farm had not matured. Some of the living fences were fairly good, but the double-row fences were still young. We thought we might have to wait a few more years for the development to bear fruit.

At this point we decided to "shoot the works" to see whether the rabbit population could be increased. It seemed good strategy to try several ideas at once and, if they were successful, to try later to find out which one was most effective rather than risk several more years in trying one thing after another. Consequently, we started a program of predator control, and at the same time began letting roadsides, fallow fields, and other waste areas grow up to natural cover. Meanwhile, of course, the wildlife management plants on the conservation farm progressed toward maturity. It would be hard to say which factor caused an increase in rabbits, or whether different factors worked together to reach the desired goal. At any rate, there was a decided jump in rabbit numbers on the study area.

Nature has many ways to confuse researchers, and sometimes it is pretty hard to separate what we have done from what Nature accomplishes by herself. We suspect that results will have to be discounted a bit because of a widespread increase in Maryland's rabbit population during the past year. Even after such a discount, however, it looks as if we were pretty successful on the conservation farm. Records indicate nearly a tenfold increase on that unit, as compared with no more than a threefold increase on the control farm. Probably the difference between the two units will be even greater in winter, since the control unit has almost no protective cover.

Some other developments may be of interest to farmers. Roadsides on the conservation farm have grown up largely to sericea lespedeza, which is rapidly crowding out some of our most pestiferous weeds. We do not know what the next step will need to be in rabbit management. But we think we can save a lot of unnecessary mowing, add good wildlife cover, and perhaps make real progress in weed control by merely easing up on intensive treatment of waste areas.

Wildlife plantings on an odd patch of the Patuxent demonstration farm.

We do not as yet know how hard it will be to control woody plants in these areas, but early results with selective use of herbicides are encourging.

As to nongame species such as migratory birds, results have been good from the start. Multiflora rose fences are popular havens for mockingbirds. They seem to offer better winter homes than nesting places, yet quite a few have nested in the fences. For example, 39 mockingbirds were banded during the past summer along one of the fences. Ten of these were adults, seven nestlings, and the others juveniles. The total population of the conservation farm must have been considerably larger. Other birds that seem to profit especially from the fences include cardinals, towhees, indigo buntings, and even the blue grosbeak, which is not an abundant bird in this area. In short, the living fences and contour hedges have made a real contribution to bird life on the farm.

We have been interested in living fences, not only for their value in wildlife management but also for other values in the farm program. We cannot give a final report now on the multiflora hedge as a practical substitute for wire fences. From the first few years' study, however, it seems that the living fence may be a bit more expensive than wire to install, may require considerable fertilizing and care in the early years, and possibly will require some supplementary fencing in areas of poor soil or in unfavorable places. We believe, however, that once the fence is stock proof, it will provide a fence without maintenance for a longer period of time, is more easily installed around a curve, and will certainly add more to the beauty of the farm than wire. The blossoms in spring and red fruits in winter add touches of beauty thrown in gratis.

As to its threat as a weed, the rose will spread in some places if given a chance. We have no evidence, however, that it will become a severe pest if ordinary precautions are taken. There seems to be no danger that it will spread into a pasture, since cattle browse it back effectively. It offers no problem in a cultivated field that is plowed or disced every 2 or 3 years. In other places it may require some attention, but generally less than many other weeds which the farmer fights.

We are not ready to give final conclusions in this preliminary and nontechnical report. Two technical papers dealing with responses by birds are now in press and others will be prepared as we reach conclusions. We believe, however, that the farmer who wants to give some consideration to wildlife in his program will not need to sacrifice the efficiency of his farm to do so. Many of the things which we have done make a real contribution to the farm program; others save considerable labor and time. Good wildlife management depends first upon good land management, since soil fertility is basic for good wildlife populations.

SNOW SURVEYORS AT WORK

(Continued from page 185)

The next morning was cold and clear. We had a good breakfast in short order and were carrying our gear back to the truck when Hal Cox came into the cabin to say he had seen a mountain lion. John and I rushed out to the point of the hill where we could hear snarling and yowling. Approximately 200 yards away, we saw the cougar in the shadow of some sagebrush. After watching it awhile, we made enough noise to scare the cat and it ran up the hill. Another smaller mountain lion ran out of the brush and followed the first one.

We ran onto cougar signs nearly every trip into this area the rest of the winter, but did not see any more cats.

DISTRICT PROFILE

WILLARD COOK of ILLINOIS

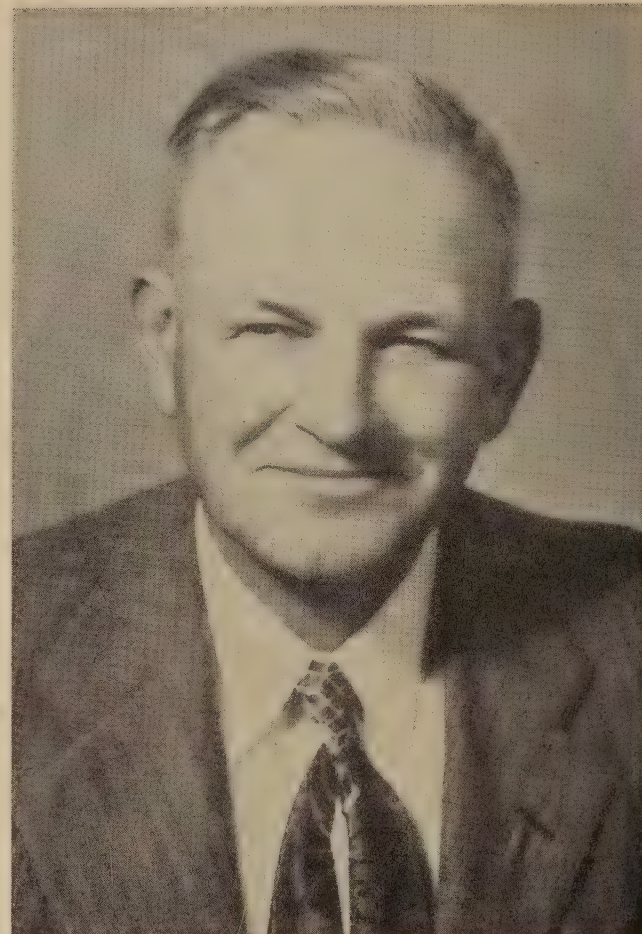
WILLARD COOK gave the Association of Illinois Soil Conservation Districts energetic, capable leadership in 1955 and was reelected for a second term as president. During his first term in office he devoted much of his time to visiting district boards of directors throughout the State, exhorting them to assume greater responsibility. He writes a letter to all district directors in the State periodically to inform them on current district operations and program improvements.

Willard's active interest in soil conservation has been evident throughout most of his life. A native of Mahaska County, Iowa, he recognized the importance of better soil management while helping with farm work during his youth. After 8 years of experience in industrial work in Chicago and vicinity, he rented a farm in McHenry County in 1934. He operated two other farms on a rental basis before purchasing the farm he now owns southwest of DeKalb.

He insisted on soil improving crop rotations and other conservation practices on the farm he operated even while he was a tenant. His farm is now rented on a fifty-fifty livestock share lease. While his DeKalb County farm is in the corn growing section of Illinois, he keeps a legume-grass meadow on as much land as is planted to corn. Small grain is used in the 5 year rotation to establish the meadow seedings.

Cook has been a director of the DeKalb district since its formation. He is an ardent advocate of soil and water conservation education. He thinks that local people should do all they possibly can to help themselves. He believes, however, in asking for assistance from any authentic source to help with any problem that the local people are not equipped to handle. Willard recommends that local leaders handle as much of the districts' promotional work as possible in order to release SCS technical help for jobs requiring special training.

Willard and Mrs. Cook have two children—Barbara and Kenneth. Barbara, who was graduated from Adrian College, is secretary of the Children's Division, National Council of Churches. Kenneth, an Iowa State College graduate, received a M.A. degree from Garrett Biblical Institute. He has been ordained as an agricultural missionary. Kenneth, his wife and baby are now in Costa Rica where he is studying in preparation for work in Bolivia.

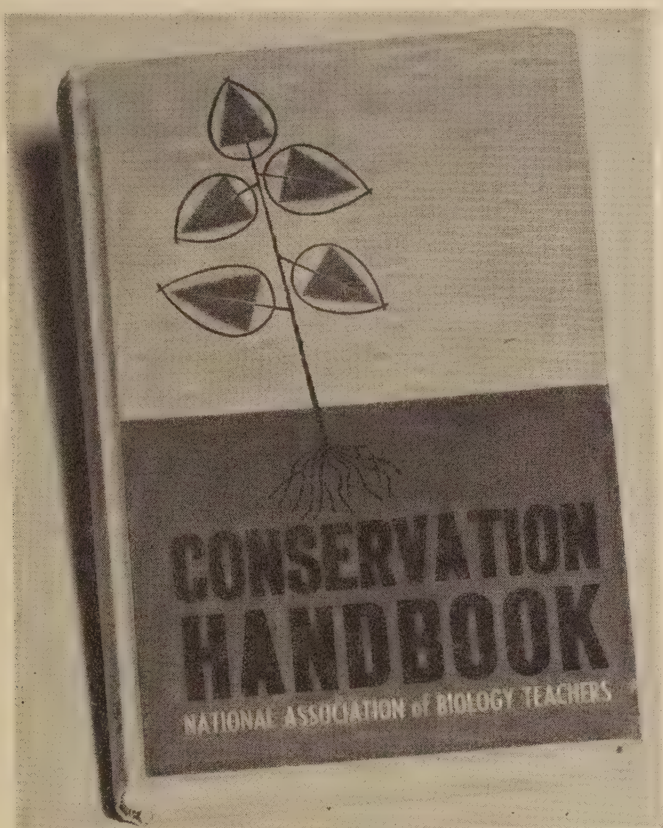


Willard Cook

Both Cook and his wife are active workers in the Methodist Church. He is a member of the official board of the church. Willard also serves as county school trustee. He was a 4-H Club Leader for 11 years and has been identified with many agricultural and civic activities.

REVIEWS

HANDBOOK FOR TEACHING OF CONSERVATION AND RESOURCE-USE. By The National Association of Biology Teachers. 499 pp. Illustrated. 1955. Danville, Ill.: Interstate Printers and Publishers, Inc. $4.



THIS publication, financed partially by a grant-in-aid from The American Nature Association, was prepared during a 3-year period by the National Conservation Committee consisting of 11 regional chairmen, 48 state chairmen, and an advisory committee of 34 representatives of national conservation and education organizations. Dr. Richard L. Weaver, Conservation Department, School of Natural Resources, University of Michigan, served as chairman.

In addition to contributions from 200 teachers from 30 states showing how they have incorporated conservation and resource-use into their schools, special contributions from conservation agencies are also featured in this attractive and useful handbook.

The mass of well-organized and fully indexed material in the handbook is designed to help teachers get started on the important job of teaching conservation in both elementary and secondary schools. It is not a text but a *handbook* or *guide* to some of the outstanding examples of good conservation teaching in the United States. It contains many examples and illustrates the great variety of useful and successful methods and techniques available to teachers of conservation and resource-use.

Although particularly useful to biology teachers, the handbook should be a ready reference for professional conservationists who work with teachers and youth groups. The ultimate objective is the same for both groups—that conservation becomes a *way of life* with more and more people accepting the concepts of conservation and governing their lives accordingly.

The busy teacher will find much practical guidance in such chapters as: How Can I Start Teaching Conservation and Resource-Use?; What Can I Do to Extend Conservation Teaching to Other Parts of the School and to the Community?; How Can I Use the School Grounds in Teaching Conservation . . .?; and How Can I Use the Community in Teaching Conservation . . .?

The appendix contains, in addition to a 27-page list of free or inexpensive material for teaching conservation, an annotated list of 24 sound motion pictures and 124 filmstrips on conservation.

The handbook may be obtained through the office of Dr. Richard L. Weaver, Project Leader, P. O. Box 2073, Ann Arbor, Mich., with a 20 percent discount to schools. The proceeds will be used by the NABT Conservation Committee to continue its education activities in various states.

—ADRIAN C. FOX

WATER-RIGHT PRINCIPLES.—The State Supreme Court of Arkansas recently upheld the right of a fishing camp operator to enjoin irrigating farmers from pumping the level of a lake so low as to damage his fishing and boating business. The decision, delivered October 24, 1955, at Little Rock by Associate Justice Paul, recognized fishing and recreation as one of the lawful uses of water under riparian law.

UNITED STATES
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TWO NEW SCS MOVIES.—About a year ago five soil conservation district supervisors piled out of a car parked in front of the Agriculture Building in Washington, D. C. They marched into the building, down a flight of stairs, and through a door over which were white and red lights and a big warning sign—SILENCE—DO NOT ENTER WHEN RED LIGHT IS ON. They walked in, took off their coats, and went to work. Their job was to play the part of themselves in a new movie on watershed protection, "From The Ridge To The River."

Just about the same time a professional actor dressed in suntans was standing in the middle of a field on a nearby Maryland farm examining a tool strange to him, a soil auger. He was preparing to play the lead part of a soil surveyor in another new movie, "From The Ground Up."

These two color films are now available and can be obtained from Soil Conservation Service.

"From The Ridge To The River" tells the story of a small watershed, how it was plagued with floods and how the people in both the farming and city areas banded together to do something. You may find situations in this story similar to those you know firsthand. It is hoped that you do, for this film is intended to portray the important part small watersheds have in the prevention of floods. Dramatic action in the movie will hold your interest and that of the large TV audience it is hoped will see it. This film has been cleared for television. It is 26 minutes long.

"From The Ground Up" is the story of a soil surveyor who "is proud of his job." He describes his work in understandable terms and shows how it is important to the preparation of a conservation farm plan. This film was produced in cooperation with the National Plant Food Istitute. It is intended mainly for use in quarter hour television programs and has a running time of 13 minutes.

—ROBERT B. BRANSTEAD

NATIONAL LAND JUDGING CONTEST.—The 5th National Land Judging Contest will be held May 4, 1956, at the State Fairgrounds, Oklahoma City, Okla. This contest is sponsored by Station WKY AM-TV and businessmen of Oklahoma City. The 2nd National Range and Pasture Judging Contest will be held in conjunction with the land judging.

On May 3, a school of instruction will be provided for both the land and the range and pasture judging contests for all out-of-state participants who wish to make a study of soil and pasture conditions in Oklahoma.

The five divisions for contestants include: 4-H, FFA, women and girls, collegiate, and adults. Awards in the form of money, medals, trophies, and plaques will be presented the contest winners.

EROSION UNDER FURROW IRRIGATION

(Continued from page 179)

sion though the furrow flow continued at the same or greater rate.

The use of a large head at the beginning of an irrigation to get the water through and then making a final setting has some justification from the standpoint of irrigation efficiency and convenience. From the erosion standpoint, however, the surge of the large stream will cause excessive erosion. A good irrigation recommendation is that the initial stream be large enough to "get through in about one fourth of the time required for the irrigation." After the water gets through it is cut back to where it just reaches the end of the furrow and has very little runoff. This recommendation is a compromise between erosion control and irrigation efficiency.

Steep slopes are more vulnerable to erosion than the gentler ones. Under average irrigating conditions where the runoff from the end of the furrow is from 20 to 50 percent, reducing the furrow grade causes a distinct reduction in erosion. It also permits better distribution of moisture and increases absorption or intake. The gains from decreasing the furrow grade are offset somewhat by the greater flow required by the increased intake.

APRIL 1956

SOIL CONSERVATION

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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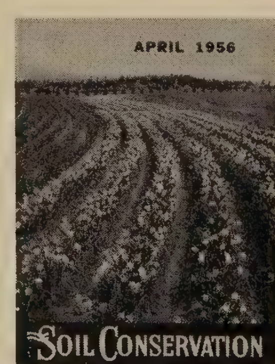
25 percent discount on orders of 100 or more subscriptions mailed to a single address

WILDLIFE STAMPS.—The National Wildlife Federation is now distributing wildlife conservation stamps. The series was started in 1938 when Ding Darling, famous newspaper cartoonist and first president of the Federation, painted a set of poster stamps to raise money for the struggling, young organization.

The 1956 issue contains two new features. One group of six stamps shows kinds of wildlife that are threatened by extinction: The grizzly bear of the Western mountain region; the Everglade kite; the depleted sturgeon of the Great Lakes; the rare whooping crane; the Montana grayling of the Northwest; and the Key deer, a diminutive race of whitetails found only in the coral islands off Florida.

The other new feature is a series of stamps depicting nature's camouflage. The American bittern, smallmouth bass, green snake, snowshoe hare, woodcock and luna moth are painted in scenes showing how natural coloration helps protect the animals from their enemies.

Editors are invited to reprint material originating in this magazine.



FRONT COVER.—Daffodils on the contour, Van Hevelingen Nursery, Multnomah City, Oreg.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

More Grass . . . Less Cotton

More grass and sorghums and less cotton help the Buchanans of west Texas control wind erosion and provide a more stable income.

By W. S. GOODLETT

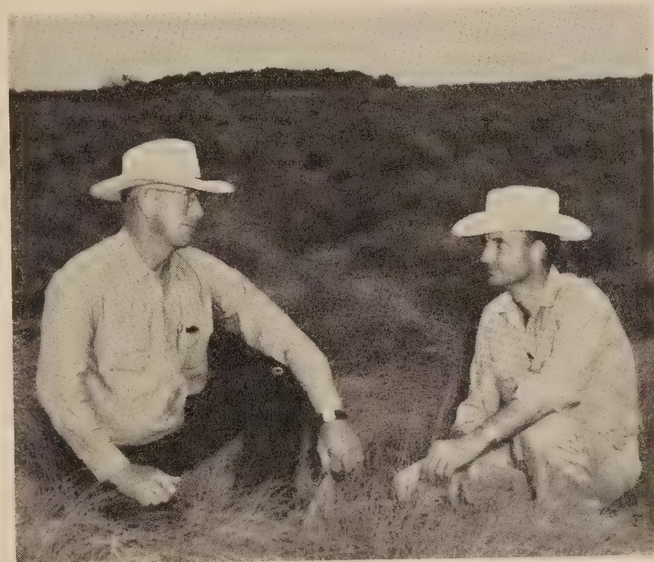
YEAR-ROUND grazing for his herd of 20 registered Herefords is being provided, and wind erosion damage is being greatly reduced on Sam F. Buchanan's farm-ranch setup about 9 miles northeast of Big Spring, Tex., as the result of a soil and water conservation program which puts each acre of land to its proper use.

Buchanan, a past president of the Howard County-South Plains Hereford Association, owns 320 acres of cultivated land and two sections of rangeland. He and his brother, Roscoe, own the cattle jointly, and the latter has one section of range. Soil surveys show that much of the land is unsuited for cultivation.

Back in 1932, Sam Buchanan acquired a 35-acre sandy field on which cotton had been grown for many years. By 1949, this tract was threatening to seriously damage all the land around it. The field had been blown out to a depth of 2 feet with the soil being drifted in a high ridge along the turnrow at the edge.

Buchanan decided to try to do something about this eroded field and became a cooperator of the Martin-Howard Soil Conservation District in 1948. He received technical guidance from the Soil Conservation Service, and seeded the 35 acres to sand and weeping lovegrasses between 1949 and 1951. About half of the field was seeded with two rows of each of the grasses alternating, while the grasses were mixed on the other tract.

The lovegrasses green up early in the spring and provide good grazing and play a prominent part in his year-round grazing program. Buchanan plants hairy vetch and rye on some of his cultivated land for winter grazing, and has been planting Sudan grass for summer use. The lovegrasses fill the gap between these. Twenty acres of sandy land were planted to Sudan grass last year to provide a residue cover in which blue panicum grass will be planted this spring. Blue panicum is a perennial and extremely drought resistant grass. Buchanan believes that it would be much better for his land as well as good insurance against dry years to have as much of his grazing land as possible in perennial crops. In addition, he plants about 60 acres to a mixture of 2 parts of hegari and 1 of redtop sumac cane. This is cut as bundle feed for winter use.



Sam F. Buchanan, rancher, and Marion F. Everhart, SCS conservationist, of Big Spring, Tex.

About two-thirds of Buchanan's rangeland is very sandy. Heavy grazing with very little summer rest over the past years had reduced the stand of native grass and had almost eliminated the best grasses. He rests all of his sandy rangeland every summer for at least 4 months, then uses this grass during the remainder of the year. In addition, he has over seeded 100 acres of this land to a mixture of native bluestem, switchgrass, Indian grass, and sand lovegrass.

In trying to get each acre of his land into the best possible use, Buchanan is controlling mesquite and prickly pear on about 30 acres.

Note.—The author is area conservationist, Soil Conservation Service, Big Spring, Tex.

Cattle grazing lovegrass on the Buchanan ranch.

All of the mesquite has been killed with kerosene which is poured around the base of each tree. The prickly pear has been hand grubbed. The remainder of his rangeland has a growth of Havard oak, known locally as shinnery, in addition to the native grasses. The best control of this low growing oak, believes Buchanan, is in managing his rangeland to provide for strong healthy grass plants that can compete successfully with the scrub oak.

All of Buchanan's cropland is terraced and farmed on the contour to conserve moisture, and he leaves a 14-inch stubble on his grain sorghums to provide protection against wind erosion.

Buchanan will plant cotton this year on 93 acres of his land that is best suited to this crop. The average yield of cotton in this area is around one-third of a bale to the acre. The last 5 years have been very dry; in fact, there was so little moisture in 1952 that a crop was not planted. The yield in 1953 and 1954 was around one-fourth of a bale to the acre. In 1955 he made only 14 bales on 100 acres due to extremely dry weather, with only 6 inches of rain from July 1954 until January 1956, a period of 19 months.

A son, D. C. Buchanan, is following in his father's footsteps in establishing a similar program on an adjoining farm which he operates along with three others. The son is operating a profitable dairy from a herd of 50 cows.

A 30-acre field on the son's farm was being severely damaged by wind erosion with some sand drifts as high as 12 feet being formed. This field was seeded to a mixture of switch, Indian, bluestem, and sand and weeping lovegrasses in sorghum stubble in 1951 and made a good stand despite the drought.

All grasses on this field made seed the past 3 years on less than an average of 10 inches of rain. This field has been rested during the summer each year and grazed during the winter with the dairy cattle. He has been able to graze a cow to the acre on this field for a period of 3 months. In the fall of 1954, D. C. Buchanan harvested 3,000 pounds of combine run grass seed from this field. He plans to use this seed to revegetate additional acres of sandy land.

Young Buchanan is planting 200 acres of redtop sumac cane each year for silage, and also plans to try switchgrass in rows. He uses hairy vetch and rye for winter grazing, and has some land in cotton.

TREES PROTECT.—Planting steep slopes to trees protects the land and puts it to good use, and with the Nation's timber supply rapidly shrinking, this is sound land use and sound economy as well.

SEEDLINGS READY.—About 21,000 good 4-year-old white pine seedlings will be ready for purchase from the Northeastern Worcester County (Mass.) Soil Conservation District in April. The supervisors will let district cooperators know how and where to pick them up.

The seedlings are growing in the nurseries established in the spring of 1954 at Lancaster, Leominster, and Littleton by the Worcester Council of Boy Scouts of America.

—Gayland Folley

Vermont Brothers Improve Farm

The Gilbert brothers wanted to raise their standard of living by increasing the productivity of their land—they became efficient soil conservationists and did both.

By GEORGE W. KNIGHT

"WHEN I came home from the army in 1945 I decided I'd stay on the farm if I could make a good living from it; otherwise, I was through. I wanted a good standard of living: new car, new barn, attractive home, and so on." Eustache Gilbert thus told his views to his older brothers, Sauveur and Eudore Gilbert, who had been operating the 200-acre dairy farm near Montpelier, Vt.

Note.—The author is a Soil Conservation Service technician at Montpelier. Vt.

"We're right with you, boy," the brothers chimed in. They were tired too of just scratching a living from the unyielding earth.

So the brothers tried different things. There was no upturn in production that could be noticed. Expected results didn't come about. Like the time a salesman convinced them that the land needed phosphate fertilizer. They bought 18 tons. But the phosphate didn't change the big boulders that dotted their pastures. It didn't remove the tree stumps. Nor did it change the poor-quality vegetation into something the cows would lick their chops over.

Then the Gilbert brothers sensed that their soil was unyielding because they weren't using or treating it right.

They started reading the farm magazines. They learned they might get help from the Soil Conservation Service, through their local soil conservation district.

In 1949 SCS technicians helped the Gilberts plan a conservation program for the whole farm. The brothers signed an agreement with the Winooski Soil Conservation District to carry out the program. That entitled them to use all the district's resources in their conservation work.

Eudore, Eustache, and Sauveur Gilbert.

Since then the Gilberts have been moving ahead. They have reached that high standard of living they were seeking. They are now working toward a still higher one.

Production figures tell the story. In 1948, the year before the Gilberts started their conservation program, they were milking 43 of their 72 cows. That year the cows produced 101,732 pounds of milk. In 1955 the brothers had 98 head of cattle, were milking 60 by autumn. They figured milk production for the year at about 400,000 pounds.

In mid-1955 the Gilberts were milking 13 fewer cows than at the same time the previous year. But they were getting 500 to 700 pounds more milk daily. Why? Better pastures and meadows! They used to have only 3 months of good grazing. Now they have 6.

Gross income from milk in 1955 was almost three time as much as it was in 1948. Net income was more than three times as much.

The way it was in 1949, the Gilberts had to buy hay every year. Not any more. Not since 1954. That year they put up more than 200 tons of their own hay. Now they produce all the hay they can use.

The cows are fed a 16 percent protein dairy ration concentrate. They get little of this, however, when the pastures are lush. Then they may go 4 or 5 days without any grain or other concentrates.

Although the Gilberts have increased the number of their cows from 72 to 98, they spend only about $5,200 a year for grain. A team of horses and 30 head of young cattle account for $1,000 of the total grain bill.

In addition to milk receipts, the brothers have a tidy income from maple syrup produced by their well-managed woodland.

Two years ago the Gilberts completed a big barn that they paid for entirely from the increase in milk production. It's big enough for 70 milk cows. They used lumber from their own woodland for the barn. They did all the work themselves. It cost $8,600. Would have cost them at least $5,000 more if they had to buy the lumber and pay for the labor, they figure.

The Gilberts have also modernized their home. Again they used lumber from their own woodland. Interior trim was done in black cherry and white ash. Eudore did all the trim and

Stumps, rocks, and brush dotted the farm before the Gilbert brothers started their improvement work.

cabinet work. He's the cabinet maker of the family. He also makes violins as a hobby.

"We used all the money we could scrape together on our conservation work," Eudore said, "but it has been a great investment."

To get their conservation program rolling, the Gilbert brothers bulldozed the tree stumps, rocks, hummocks, and brush off the land. That was the first step in getting their land ready for full production of top-quality grazing and hay crops. They spread this job over several years. The total cost was about $4,000.

Next they harrowed the cleared fields. They spread 3 tons of lime and fertilized with 700 to 800 pounds of 0–14–14 an acre plus barnyard manure enriched with superphosphate.

With the nurse crops the Gilberts seeded grasses and clovers. The cows grazed the nurse crops off and then the grasses, and clovers came through.

Before the brothers began their conservation work, their cows had to get along on June grass, spiraea (hardhack) and other poor vegetation. Now they feast on ladino and alsike clovers, bromegrass, and timothy.

The 60 acres of pasture is divided into five plots for rotation. Sixty acres of meadows furnish hay, mostly timothy. The meadows are usually grazed before and after hay cutting. Weeds are kept under control by yearly mowing.

The Gilberts are alert to their soil's needs. They keep the land limed and fertilized according to scientific tests.

(Continued on page 213)

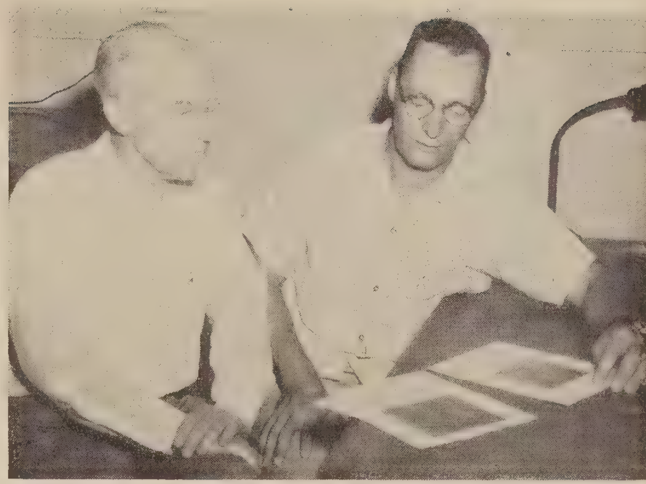
Conservation on the Buckskin Hills

A former university professor and his tenant cooperate with their soil conservation district to check erosion and restore fertility to a rundown farm in northeastern Nebraska.

By WALD H. RODENE

ALL of us in northeast Nebraska are familiar with the buckskin hills, a descriptive term that characterizes the region and at the same time indicates that soil erosion is a serious problem. To those not acquainted with this area it means that the once dark fertile topsoil that covered the hilltops and hillsides has gradually been eroded away by wind and water—exposing a light yellowish brown subsoil. From this light colored soil the term buckskin has originated. As these buckskin areas grow larger, production goes down, since the topsoil has been washed away.

Note.—The author is work unit conservationist, Soil Conservation Service, Wakefield, Nebr.



Joseph Alexis and Waldo H. Rodene of SCS checking soils and land use maps.

For some time local Soil Conservation Service technicians, the county extension agent, vocational agriculture and veteran instructors had been interested in working on an eroded farm to prove the value of their recommendations. Joseph Alexis, a former instructor at the University of Nebraska, who owns a farm 3 miles north of Emerson, Nebr., offered to place it under a complete conservation program. Alexis stated that, "Erosion has carried on its work of destruction on our farm during the last several years to the extent that it hardly seemed worthwhile to cultivate the ground any longer." He became a cooperator with the Soil Conservation District in 1951. William Steinman, operator of the farm said, "I would like to see for myself what soil conservation practices can do for a farm such as this. But, I'm

Terraces, strip crops, and grass waterways on the Alexis farm of the Buckskin Hills.

doing this more for my boys than for myself. They are going to learn a lot and will need all the information they can get in order to make a good living on farms such as this in the years to come."

For comparison purposes, the average crop production for the years 1943 to 1951 was taken from records as follows: Corn—21 bushels per acre, oats—19 bushels per acre. The use of alfalfa is mentioned only once during that period. Erosion was severe. Rills were many. A 25-foot gully was gouging its way through the west part of the farm. Cockleburs thrived.

The soil conservation program began on this farm in the spring of 1952 when approximately 2 miles of broad base gradient terraces were constructed, 5 acres of waterways and turnrows established, and 20 acres seeded to alfalfa. About $1,000 was spent for fertilizer and seed. Small check plots were marked off. During the first year the corn yielded 44 bushels per acre, as compared to 15 bushels on the check plot; oats yielded 25 bushels per acre, as compared to 10 bushels on the check plot; and an excellent stand of legumes was established.

In 1953 more terraces and waterways were added, fertilizer was applied, and 15 acres seeded to bromegrass and alfalfa. That year the corn yielded 46 bushels per acre; oats, 20 bushels per acre; beans, 20 bushels per acre; and the alfalfa produced more than 1 ton per acre per cutting.

In 1954 the corn yielded 50 bushels per acre; oats, 41 bushels and alfalfa, 1 ton per acre per cutting. The huge gully was shaped into a waterway and seeded.

In 1955 more alfalfa and bromegrass were seeded. Though rainfall was a limiting factor, the oats yielded 45 bushels per acre and alfalfa about a ton per acre for the first two cuttings, the last being kept for seed. Because of the continued dry weather the corn yielded only 13 bushels per acre.

To date 7.3 miles of terraces have been constructed, and 11 acres of waterways have been established, plus the turnrow and roadside seedings.

William Steinman stated, "It is hard for me to recall just what the farm looked like only 5 years ago—rough, eroding, and sparse in growth. Today the rills are gone, and erosion has stopped."

William Steinman, tenant, and Joseph Alexis, farm owner, checking prospects for the corn crop in 1955.

Joseph Alexis states, "Due to the interest of William Steinman and his sons, who believed in the possibility of restoring the farm to productivity, and to Waldo Rodene, work unit conservationist, and his colleagues in soil conservation in northeastern Nebraska, we became convinced that our farm had not completely lost its value for future generations. Personally I felt it the duty of those who own the land now or in the future to preserve it for the citizens who are to follow. The land must be restored to full productivity.

"When we were at the farm a few days ago, we were no longer confronted with the deep canyon of the past. The rains are no longer carrying off the soil. The water that falls from the skies now remains in the terraces, to advance the growing crop a second and third day after the showers have passed by. Nothing can be more stimulating to a farmer than to see his plot of land extend its usefulness instead of shriveling to worthlessness and to note in the course of the years an increasing instead of a diminishing crop."

Many tours with good attendance have been held on the farm by Waldo H. Rodene of the SCS, Howard Gillaspie, county extension agent, school teachers, bankers, and others.

Teamwork to Conserve Soil and Water

The Latah Soil Conservation District held a family reunion of supervisors, SCS technicians, county agents, and others who helped promote the district program over its 15 year existence.

By HUGH F. EAMES

AT a luncheon reunion at Moscow, Idaho recently, Latah Soil Conservation District demonstrated how 15 years of tightly built-in leadership and teamwork have been developed into highly effective community service.

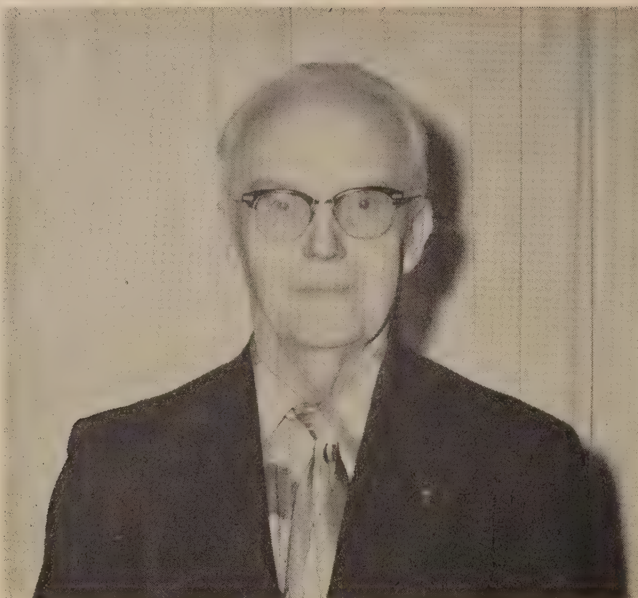
It was a unique family affair—an informal and almost spontaneous gathering of men who had served as supervisors of the farmer-organized and farmer-operated enterprise, under Idaho state law, since May 1, 1940. Guests included representatives of the Soil Conservation Service, Extension Service, and the Agricultural Stabilization and Conservation county committee and its ACP program. Altogether 32 people were there. Among them were 18 of the 19 farmers who have been supervisors of the district for one or more 3-year terms, SCS technicians who have worked with the district since 1937, and the three Extension representatives who have been county agents since the district was created.

Latah Soil Conservation District is outstanding for more than effective teamwork. It is the first district organized in Idaho, growing out of one of the first soil conservation demonstrations established nationally. It won the Goodyear Award for outstanding services in 1953-54. It has about 1,200 active cooperators who operate nearly 300,000 acres—more than 78 percent of the land in Latah County.

The district has been cited for operating excellence. It had an important part in organization of state and national soil conservation district associations, has been highly influential in the launching of other soil conservation districts in Idaho and adjacent States, and was a leader in establishment of the women's auxiliary for wives of supervisors and cooperators. And, the women have done a top-flight job in developing the education phase of the district program, particularly in getting soil and water conservation studies established in public schools.

For 15 years Latah Soil Conservation District has always had the assistance of Soil Conservation Service technicians who are remembered and appreciated by supervisors and cooperators. Latah is different from most other districts because these technicians do not work out of one office at Moscow, the county seat.

Men who have been supervisors of Latah Soil Conservation District and the three county agents who have served as secretary for the board: in the lower row, left to right, are members of the first board of supervisors—Guy Kitch, Henry Bottjer, Ralph Naylor, K. D. Ingle, Roy Emerson, and secretary G. T. McAlexander. Above are others who have been supervisors or secretarys during the past 15 years: left to right, Roy Glenn, Jones McCown, George Comstock, Harley Eichner, Kenneth Wilkins, Oscar Hoseid, Harry Benscoter, Eugene Thompson, Reuben Bauer, A. E. Koster, Harold Snow, John Luedke,Frank Brocke, Fourth Thomas, and Elbert McProud.



Henry Bottjer of Moscow, Idaho.

They are distributed over the district in four different stations, called subunits. Each is responsible for work in his area, but when emergencies or special problems arise they step over the line and help one another.

Latah also is different because its fleet of equipment is not housed at the county seat. The light machines and tools owned by the district—12 to 16 pieces—are located at 6 different depots. These are centrally located where farmers can get to them easily. The supply centers, as agents of the district, keep the equipment in good operating condition, and handle all transactions, including service charges, with the farmers. Once the district was in the heavy equipment business. That was in its earliest years, and since then contractors have done the heavy business, which had been a headache for the supervisors and staff.

Paradoxical as it may seem, Roy Emerson, a district patriarch points out, "It is this method of spreading out services over the whole district, making it easier for busy farmers to get help, that has made a smoothly functioning team."

Throughout the years close cooperation between the district, SCS technicians, and the schools of agriculture, engineering, and forestry at the University of Idaho at Moscow, has produced many direct benefits for all participants.

Perhaps the cooperative spirit that the district has developed is best demonstrated in the educational phase of the program: 1,600 soil and water conservation posters, done by school boys and girls were displayed in Moscow store windows at one time, and numerous others were shown in other communities in the district. Nearly 1,500 jingles were submitted by school children in a district-wide soil and water conservation competition. The cooperative spirit also is found in 6 annual community agricultural days sponsored in the district, and in many agricultural tours on the ground and in the air. Likewise, it is to be found in soil loss and woodland experiments, weed control studies, alfalfa establishment tests, studies of returns from conservation farming, sprinkler demonstrations, and so on. Then there is the annual soil and water conservation issue of the *Daily Idahonian.* And neighborhood meetings, at 58 of which, 400 farmers participated in one year.

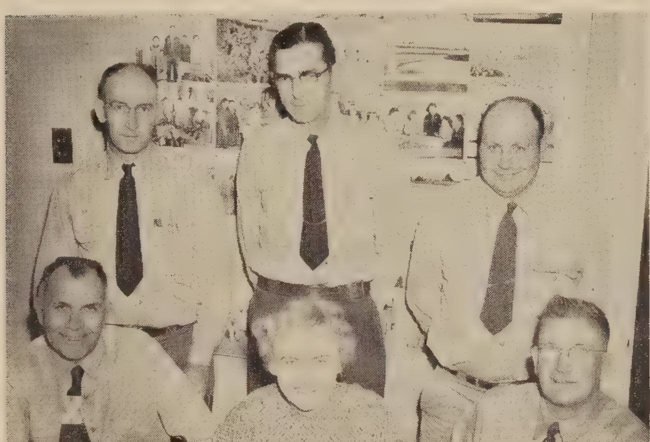
All of these developments, and many more activities, have come about because Latah Soil Conservation District has won the respect, confidence, and support of nearly all Latah County farmers, large numbers of nonfarm people, local newspapers and radio stations, schools, colleges and churches, and almost every kind of an organization you can think of! Double barreled teamwork has made the Latah Soil Conservation District IT in Latah County. As Fourth Thomas of Princeton, a former chairman of the group, says, "Latah goes about keeping its soil and water conservation program in operation, not just for today or for tomorrow, but for as long as we depend on the soil to furnish nourishment necessary for life."

G. T. McAlexander, who was county extension agent when the district was born, pointed up importance of overall teamwork when he told the reunion gathering that "No one bunch did it all. We all just worked together." And Guy Kitch of Troy, one of the original supervisors, recalling early difficulties with heavy equipment, referred to McAlexander as "vice president in charge of balky machines." Latah Soil Conservation District has been lucky, Kitch declared, "because we have had good SCS technicians, and three good county agents."

When Roy Emerson of Genesee was introduced as a supervisor and district treasurer who had served for 21 consecutive years and had been a main cog in organization of the district, it was declared that he is one "to whom a monument should be erected in recognition of the good that he has done for the whole county."

Fourth Thomas pointed to need for developing a program that will encourage farmers to stay with conservation farming once they have established the system on their land.

One of the four women who were guests of the supervisors, Mrs. Jo Ann Thompson of Moscow, presented the essay that she had prepared in national competition, sponsored through the National Association of Soil Conservation Districts, under the title "Goals of My Soil Conservation District." She is the wife of Supervisor Eugene Thompson.



The SCS team servicing the Latah Soil Conservation District: bottom row, left to right, J. M. Rabdau, Mrs. Winifred D. Hodgson, John T. Nicholas; top row, Manning Onstott, Harold Felgenhauer, Larry Sorensen.

Attending the reunion were former and present supervisors representing all parts of the county. At the head table with Henry Bottjer of Moscow, who served 6 years as chairman and who at 76 is dean of the group, were Ralph Naylor, Roy Emerson, King Ingle, and Guy Kitch, members of the original board; and Jones McCown, Harry Benscoter, Harold Snow, Fourth Thomas, Frank Brocke, A. E. Koster, Harley Eichner, Kenneth Wilkins, George Comstock, John Luedke, Roy Glenn, Eugene Thompson, and Oscar Hoseid. Glenn, Luedke, Comstock, Thompson, and Hoseid are present supervisors, Glenn being chairman. Kitch, Snow, Thomas, Koster, and Eichner, along with Bottjer, also have been chairman.

At other tables were the current technicians of the SCS, James Rabdau, John Nicholas, Manning Onstott, Harold Felgenhauer, and Lawrence Sorensen; the two former and present county agents; Mrs. Winifred D. Hodgson, SCS office clerk; Miss Martha Darscheid, ASC-ACP clerk; Mrs. Jo Ann Thompson, and Mrs. Maribel Schupfer Samuelson, reporter-photographer for the *Moscow Daily Idahonian.* Rabdau, who heads the SCS staff at Moscow, has been a SCS technician in Latah since 1937, 3 years before the district was organized.

From the supervisors' angle, Harold Snow of Moscow, looked back over the district's years and commented: "Soil conservation district supervisors serve without compensation of any kind, either salary or travel costs. Those of us who have served on the board of supervisors consider that it has been an honor and a privilege. True, it has taken a great deal of our time and sometimes cost us money out of our own pockets, but we are more than repaid by seeing the way farmers and ranchers are saving and improving their soil with the help the district is able to offer."

Roy Emerson, who has been farming since 1912, sees the current Latah situation this way: "General improvement in soil and water conditions is manifest throughout the county. Yields have been materially increased since farmers began to make better use of their land and protect it for future needs. Compliance with conservation plans made with the district, and maintenance of work are satisfactory. Cooperators' participation in the ACP cost-sharing program has advanced conservation farming and helped about 650 families. Over a 10-year period about $100,000 in ACP cost-sharing funds have been invested annually in this county. The district and SCS have helped ACP, and ACP has helped them. We have no disappointments. We have a good healthy program. The only trouble is that there are not enough farm planners and other technicians to handle all the work that the cooperators want to do.

PASTURES HELP.—Improved pasture stablizes the soil—stores soil fertility for future use.

Range and Wildlife Improved

Staggered borrow pits along cattle walkways and roads increase the value of the range and improve wildlife habitat on gulf coast marshes.

By FRANCIS J. EZERNACK

RANGE conservation plans by marshland cattlemen in southern Louisiana are setting a pattern that promises to benefit wildlife as well as cattle production throughout the whole marsh area of the gulf coast.

The large expanses of unfenced marshes produce an abundance of grass that landowners have used for grazing their cattle since the country was first settled. When the marsh is dry, cattle roam at will. When water covers most of the country, the cattle graze along the ridges, or cheniers, which mark the sites of successive old gulf beaches, usually paralleling the present coast line.

Robert E. Williams, Soil Conservation Service range conservationist, points out that over the years a strain of crossbred cattle has been developed, probably as much through natural selection as planned improvement—cattle which withstand heat, endure insects, and when necessary graze in water that is belly deep. The ridges serve as bedding grounds, calving locations, and resting places for young calves while their mothers graze.

When the water in the marshes is high, overgrazing of accessible areas result, even when the range is properly stocked, while lush growth of forage on inaccessible areas goes unused. There has always been a problem, of how to get more uniform use of the marsh range and thereby avoid overgrazing of some areas.

In seeking a solution to this problem, Mayo Boudreaux, a cooperator with the Gulf Coast Soil Conservation District, and SCS technicians assigned to the district decided to build a levee, or walkway, that would enable Boudreaux's cattle to travel more readily between the higher-lying areas of the marsh and to graze more of the lower areas.

Note.—The author is farm planner, Soil Conservation Service, Lake Charles, La.

Cattle bedding down on walkway on the Mayo Boudreaux farm.

The soil conservation district governing body agreed to the use of the district-owned dragline to build a levee on a trial basis. Boudreaux constructed the first levee along a fence boundary according to the conventional method, with earth excavated from only one side. This left a continuous ditch extending the full length of the levee through which water could move freely.

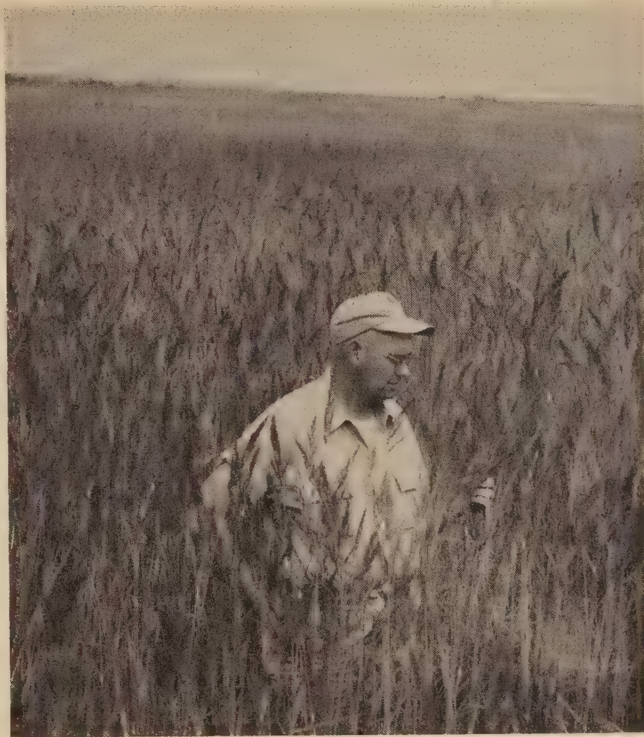
It became obvious that this type of continuous-ditch construction, if used extensively in the open marsh, would result in a greater or lesser degree of drainage, which would be detrimental to wildlife. The continuous ditch would also prevent cattle from having ready access to adjacent areas of the marsh on the side of the walkway where the ditch was located.

To avoid these difficulties, a design was worked out for staggering the borrow pits from one side of the levee to the other, leaving alternating plugs of earth between the pits which would prevent the water from draining out. Because of the high water table, this has resulted in permanent areas of open water along the walkways. These staggered borrow pits provide about 2.5 acres of open water for each mile of walkway constructed.

Many landowners in the area are much concerned about maintaining optimum conditions for wildlife. Some of them derive a considerable portion of their income from trapping furbearers and are interested in improving the marshes for ducks, geese, and other waterfowl. So, the system of building walkways with staggered borrow pits has won their approval, even though most of them were skeptical at first.

Following the original work done on Boudreaux's marsh range, SCS technicians developed a standard design for cattle walkways, with a minimum flat top width of 10 feet, a settled height of 2 feet or more above normal water level, and a berm width of 10 feet on each side of the walkway. Bridges or culverts are specified where walkways cross natural drains.

The staggered borrow pits average about 660 feet in length, with alternating sections of earth of the same length between the pits. This not only prevents water from flowing from the pits but also enables cattle to travel from the walkways into the marsh from either side. On property lines, pits may be left on the outside of the levee only, provided plugs at least 16 feet in length are left at intervals to prevent the flow of water in the pits.



Olin Dillon, SCS biologist, examines seed heads of coast cockspur.

SCS farm planners in the area say that cattle will graze about one-fourth of a mile on each side of the walkways under normal conditions. So it is recommended that walkways be at least a half-mile apart where more than one walkway is constructed in a single range unit. This enables cattle to use the range to the maximum extent on both sides of the walkway.

SCS planners also emphasize the need for adequate fences, stock water facilities, and feed reserves for critical periods to balance out a complete conservation plan for marsh ranges.

Olin Dillon, SCS biologist for the gulf coast marshes of Louisiana and Texas, points out that uniform grazing of the marsh, is beneficial to wildlife. Grazing opens up the marsh to some extent, and permits fuller use by ducks and fur bearers.

The Louisiana Wild Life and Fisheries Commission also support this view, pointing out in its fifth biennial report that forced cattle grazing in many areas has aided in opening up dense stands of sawgrass, which are unsuitable for use by either ducks or geese. "In areas where grazing can be controlled," the report states,

Oil companies have cooperated with ranchers in using staggered-pit construction for levees and roadways.

"it can be a valuable tool in managing a marsh for wildlife."

Development of staggered pit walkways has centered in Cameron Parish, where the practice originated, but it is spreading to other areas. During the past 5 years, 60 miles of walkways have been built in the Gulf Coast Soil Conservation District, which comprises Cameron, Calcasieu, and Jefferson Davis Parishes. More than half of the area of the district is marsh. Cattle walkways may extend from ridges out into the marsh 3 miles, but generally they are much shorter. Average cost per mile has been about $1,300, exclusive of cost of culverts or bridges.

Range Conservationist Williams reports that there are more than 2 million acres of marsh grazing lands in Louisiana alone, with similar important areas within other States along the coastal marsh belt extending from Texas to Florida. So the possibilities of development of walkways, with consequent benefits for grazing and wildlife, are great.

This wintering area for a large percentage of the waterfowl of the Mississippi Flyway is of vital importance to wildlife. In addition to ducks, geese, and other waterfowl, furbearers such as muskrats, mink, and otter, are a resource of tremendous economic value.

During recent years, a large rat-like animal from South America, called the nutria, has spread extensively throughout the marsh area. Although the pelts of nutria are more difficult to cure than those of the muskrat, they are worth about three times as much.

Lionel Theriot, who runs about 700 head of cattle on 1,800 acres in the area around the Grand Chenier and other leased land, expresses pretty well the reverent feeling these people have for the marsh.

"I'll tell you what I think about the marsh," he says, "I think we ought to leave it just like the Good Lord made it. You don't want too much water, but you don't want to drain it, either.

"I noticed the water in these closed pits along the walkways during the severe drought we had, and it didn't go down more than 8 or 9 inches. These pits were the only thing that saved the nutria. Some people made as much as $2,500 last year trapping them."

A high water table in the marsh is desirable also for crop production, Mr. Theriot contends.

"As long as you've got water in the marshes, you can raise corn on the ridges," he says. "But when the marsh dries up, goodbye corn!"

J. H. Meaux, of Creole, who has 2 miles of cattle walkways on his marsh range, points out that in addition to providing water for muskrats and nutria when the marsh is dry, cattle walkways prevent the cattle from bedding down on muskrat mounds.

The design for walkways developed by SCS technicians has been approved by the board of supervisors of the Gulf Coast Soil Conservation District, which makes equipment available for constructing walkways. It has also been approved by the ASC Committee.

Probably even more significant is the fact that oil companies, which have begun extensive drilling in the marsh area within recent years, have adopted the staggered-pit design in building roads for transporting materials to and from well sites. This provision is now gener-

ally included in lease contracts between the oil companies and the landowners.

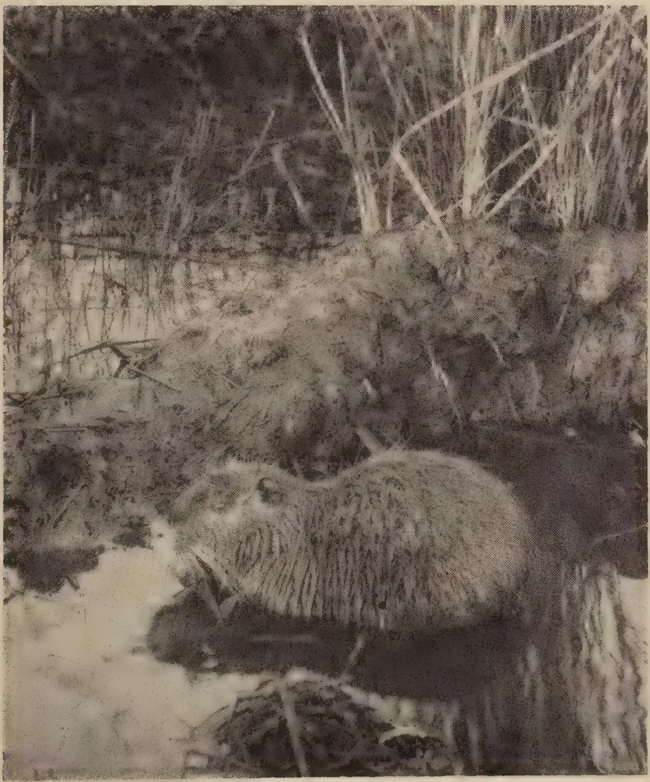
Although this method is somewhat more expensive than the old single-ditch construction, oil companies have readily adopted it. W. E. Merriman, Head of the Fee Land Department of Stanolind Oil and Gas Company, in discussing this phase of the comapny's operations explained their position in this way:

"We are always glad to work with the marshland owners to protect their wildlife and grazing resources. We try to cooperate with them in every way possible. As you know, we too are vitally interested in wildlife. We spend thousands of dollars every year to maintain a private wildlife refuge in Vermillion Parish."

A similar attitude was expressed by J. C. Watson, district engineer of the Louisiana Department of Highways.

"We are favorable to staggering the borrow pits along our highways in the marsh if the people request it," Mr. Watson said: "Our policy is to build the road above the water level and let the water do what it always did."

The staggered-pit method of construction has already been used, at the request of landowners cooperating with the soil conservation



A trapped nutria.

district, on one 4-mile stretch of the new road being constructed through the marsh from Grand Chenier to Pecan Island in Vermillion Parish.

Wildlife advocates, cattle producers, and oil companies represent three major interests involved in use of the vast expanse of marsh along the gulf coast. And construction of highways through the marsh is likely to become another factor of increasing importance.

The viewpoint of all these interests is represented in a special way by the residents of the Grand Chenier, who run cattle in the marshes, trap muskrats and other fur bearers, work for oil companies, and in recent years have had ready access to the outside world over a paved highway.

Their increasing interest in evaluating any new development in relation to its effect on wildlife may be a good omen. For in any conflict of interest, past experience has shown that wildlife is likely to be the most vulnerable to the inroads of "progress."

This new development, therefore, important as it may be as a means of making more effective, safe use of the marsh, may be tremendously more important as a symbol of how various interests may find an area of of agreement in multiple resource use, backed by popular support.

In such an approach to the complex problems involved, local soil conservation districts, as representatives of the people in seeking to develop a coordinated approach to the varied problems of soil and water conservation may have an increasingly important role.

PLANNING NECESSARY.—A sound soil and water conservation plan for the farm cannot be developed by guesswork. First, you must have an inventory of the land. By voluntary request of the landowner Soil Conservation Service technicians who are assigned to each soil conservation district make a soil and land use map of each acre.

DAILY NEEDS.—Each individual depends directly on products of the soil for daily needs of food, clothing, and shelter. Seventy percent of all goods sold at retail each year are made up of items coming from the soil.

A New Year of Conservation Opportunity

By DONALD A. WILLIAMS

IT is natural to look back on the accomplishments of past years—and those accomplishments in soil, water, plant, and wildlife conservation have been gratifying indeed. But looking back at what we have done is chiefly valuable as it helps us lay the groundwork for redoubled efforts in the years ahead.

I think we can look forward, in 1956, to one of the most challenging years we have ever had in resource conservation, from the standpoint of real opportunities for exercising leadership, technical skills, teamwork, and community action. Unprecedented public interest in our soil, water, and related resources is being reflected by the increasing demands for their conservation treatment and use.

The scope of this conservation trend is even broader than that of soil conservation districts alone. It is a growing concept that takes in *all* the resources of the community, the State, and the Nation. It involves entire watersheds as well as the individual farms and other properties making up those watersheds. It has to do with all manner of resource needs—watershed protection and flood prevention, expanding grassland farming, tree planting, and woodland conservation; water management and conservation and irrigation; development and protection of wildlife habitat; and such special land use problems as the increasing conversion of agricultural lands to urban, industrial, and other nonagricultural uses.

During the last 2 years, I have been in virtually every State, Puerto Rico, the Virgin Islands, and Alaska, and have met with or talked with thousands of soil conservation district people and others concerned with the management and use of our resources. These have included state agricultural, forestry, and conservation officials; reclamation, flood control, watershed association, and other water interests; businessmen, sportsmen, and others. Everywhere, I found not only a sharp awareness of the important conservation job we still have to do, but a definite attitude of willingness and determination to pitch into the job harder than ever and speed up our national action program of soil and water conservation in every way possible.

The major attention being given to farm and watershed resource conservation clearly shows the forward direction in which we are moving in this essential undertaking. It also indicates the potentially increased conservation opportunities and responsibilities that lie ahead.

Take, for example, the Advisory Committee on Soil and Water Conservation named last fall to advise the Secretary of Agriculture and his staff and Department agencies dealing with soil and water conservation. Creation of the Advisory Committee is the latest move by the Department to get counsel in the States. The 18-member committee represents a wide range of soil and water conservation interests geographically spread over the country.

Committee members have shown themselves to be well informed, and eager to contribute to the betterment of our national soil and water conservation program. Also, several members in committee meeting have recognized the key role of soil conservation districts as logical vehicles to help expedite conservation programs. One of these, for example, is the "Program for the Great Plains" developed a few months ago by the Department of Agriculture with the cooperation of the Great Plains Agricultural Council and now recommended to Congress by the President. This program, providing for good land use to be made a primary consideration in the various conservation, credit, and other programs in which the Department participates, well may set a pattern for more effective integration of conservation in our other agricultural programs.

Note.—This article is based on an address made by the administrator of the Soil Conservation Service at the annual meeting ofthe South Carolina Association of Soil Conservation District Supervisors, Aiken, S. C., Jan. 11, 1956.

The National Watershed Congress, the second of which was held in Washington last December, also has brought together leaders from throughout the country in constructive consideration of the highly important water conservation and development aspects of our resource conservation efforts. Farmers, businessmen, conservation leaders, and others taking part have made many good suggestions, including proposals for making the 1954 Watershed Protection and Flood Prevention Act of maximum effectiveness and adaptable to local water and land situations.

The watershed development aspect of our soil and water conservation program, meanwhile, is moving ahead with all indications that this activity will be substantially stepped up this year in soil conservation districts and communities over the country. The renewed emphasis upon watershed conservation already has seen intensified land treatment and structural work pushed ahead in the 60 pilot watershed projects for which Congress first appropriated funds in 1953. And watershed studies and planning have proceeded during the last year on locally sponsored projects proposed under the Watershed Act, Public Law 566.

A total of 430 applications for watershed planning assistance under this Act had been received up to Jan. 1, 1956, and 129 had been authorized for such assistance. Work plans have been completed for a number of the authorized watersheds. Some of the plans are undergoing final federal and state agency review, and several others are in the process of being transmitted to Congress.

The latest proposal to focus national interest on broadened conservation and land use is, of course, that which the President has made to Congress for diverting lands not currently required for production of certain crops to the growing of grass or tree crops, and thus convert those lands into a "conservation reserve." I shall not undertake to speculate on the outcome of this proposal, advanced by the President; but I think it is obvious that such an undertaking unquestionably would be of direct concern to all soil conservation districts.

As our conservation job takes on these broader proportions, particularly in the fields of water and other developments of community, state and regional as well as national interest, the opportunities and responsibilities of soil conservation district supervisors and cooperators, Soil Conservation Service personnel, and everybody else on the resource conservation team are increased accordingly. The districts, as legally constituted local agencies responsible for land use planning and treatment, occupy a key position in these developments.

The Soil Conservation Service, as the technical agency of the U. S. Department of Agriculture in the fields of soil and water conservation and flood prevention, finds itself called upon, in turn, for the utmost production of its soil surveys, conservation farm planning, and other available facilities provided through districts. There likewise are increasing demands on conservation research, educational, and financing facilities. These are available through the Department, the State Colleges of Agriculture, Experiment Stations, and Extension Services, and through other governmental and private sources.

We are fortunate in this country, I think, in being able to draw upon the experience, the organization and the facilities at our disposal in carrying out a coordinated program that includes all the pertinent elements of the total conservation concept. We have the public understanding and support I've already mentioned. We have the physical and, importantly, the human resources behind the conservation effort. And we have the organization and program facilities represented in soil conservation districts.

These include, besides essential local and State organization, authorizations, and facilities: Soil Conservation Service technical aid, Agricultural Conservation Program cost-sharing, conservation credit through private banks, the Farmers Home Administration, and other agricultural credit sources; farm forestry assistance through State forestry agencies, the U. S. Forest Service, and private foresters; and such other specifically authorized aids to conservation as the watershed protection and flood prevention machinery and the Great Plains Program.

It has taken time for general public awareness of the Nation's soil and water conservation problems and needs to develop, and for building up the local, State and Federal facilities we now have for dealing with them. And it took the vision and peristence of many conservation leaders to bring us where we are today.

Incidentally, you may be interested in learning, as I was, that the total area of soil conservation districts now has passed the 1½ billion acre mark. And, if anybody asks you for more statistics about the districts movement, here are a few figures that are easy to remember: About 80 percent of all the land in the United States is within district boundaries, as is 85 percent of our farmland and 90 percent of our farms and ranches. Exactly a third of the States are completely covered by districts, as are Puerto Rico and the Virgin Islands. Also, there are nearly 13,500 locally chosen officers who are voluntarily serving their neighbors and communities by directing the affairs of the Nation's nearly 2,700 districts.

These figures are significant because, among other things, they point up the fact that our primary objective of getting conservation on the land—watershed by watershed, farm by farm, acre by acre—has not changed. In fact, the expanding conservation demands and responsibilities actually serve to underscore this basic principle. This is true whether we are thinking in terms of an individual soil conservation district's

program, a watershed protection project, the Great Plains Program, or whatever.

I should like to say something more about this matter of conservation farm planning; because it is a basic and continuing responsibility we have—supervisors, and cooperators, and technicians together—in 1956 and the years ahead.

In the first place, it is not the technicians' job to write conservation plans and give them to the farmers. The farm plan must be the plan of the farmer himself, tailormade to his own needs, with the technician helping him to work it out, as requested by the district board of supervisors. It is the farmer's plan, and he doesn't have to be content with a plan that contains things he doesn't want or need.

A conservation farm plan, to be fully useful and meet the purpose for which it is intended, must be adapted to the present needs of the farmer and his land. One of the most important challenges to all of us is to keep conservation farm planning up to date. We can't expect a plan drawn to a 1940 pattern to fill the bill under 1956 conditions.

To keep conservation planning in tune with the times and with the thinking of the farmer who is going to use the plan in his operations calls for his full understanding of what his own soil and water conservation problems are. It calls for his own thinking about the program for his place that is to be carried out over a period of time. District supervisors have a real opportunity and responsibility to help farmers to this necessary farm planning understanding—to their advantage and to the benefit of the overall district programs.

Obviously, supervisors have to use every practicable means of spreading their responsibility and leadership, their counsel and advice on conservation farm planning and other problems and solutions under the district program, out into the different communities and on down to each farm operator. Actually, district leadership means not only that of the supervisors themselves but also of individual cooperators and groups of cooperators.

It is a question of "communication" between the supervisors and the district cooperators. It is a matter of the supervisors' keeping all the cooperators informed, as well as providing information to those who are not cooperators. This may call for having assistant district supervisors, training of others for adequate leadership, or finding other means of spreading the job.

The same concept is involved, of course, in watershed planning. It is simply broader, involving groups and community interests. But a watershed plan just as surely must be in keeping with the needs of the people affected. So a watershed plan also must be the local people's plan, based on all the available information and experience of those who occupy watershed lands and the agencies which have anything to contribute to developing the best plan there is to be had. The local-State-Federal partnership principle in watershed undertakings is just as important in their planning and development as it is in their cost sharing aspect.

This, actually, is just the old fashioned *teamwork* principle that has been recognized as basic to the conduct of a successful soil and water conservation program from the earliest days of soil conservation districts, and before. Whether it is in day-by-day districts' programs, in watershed developments, or whatsoever conservation undertaking, the teamwork of all local, state and federal interests, government and private, is essential.

In most districts, for example, the supervisors draw upon services or facilities of various agencies and groups, from county officials to State agencies interested in soil, water, forest, wildlife and other natural resources. All of these agencies are essential to the furtherance of district programs, and to the progress of the whole national program of soil and water conservation. You can't take them for granted, because it is a coöperative working relationship that is involved.

Neither, may I add, do we in the Soil Conservation Service presume to take for granted our working partnership relationship with these other agencies and with soil conservation districts. We realize only too well that we have to work at our job of giving districts the technical help they ask us to provide, as the job assigned to us by Congress and the Secretary of Agriculture.

A particularly good example of how effective teamwork of local, State and Federal agencies and private interests pays off is to be found in the progress that has been made in tree planting and the spread of woodland conservation practices, in the Southeast and elsewhere, spurred on by the increased demands for the "green gold" represented in pulp and other wood products. During the past 5 years, district cooperators in the United States have planted trees on approximately 1¾ million acres, including 15,000 miles of windbreaks.

The Soil Conservation Service has been glad to help in this important part of the soil and water conservation program, but we certainly do not claim all the credit by any means. Our Service farm planners are trained and advised by our woodland conservation specialists strategically located to serve the needs of the States. They are available to assist on woodland aspects of conservation farm development in cooperation with such public and private interests as the state foresters and private nurseries.

An estimated 25 million acres of land in districts needs to be put into trees, principally by planting but some of it through natural regeneration. The bigger part of this land is now being cultivated; but soils-site index correlation checks made in several States show that such lands now in timber are producing higher returns from wood crops than higher capability lands are producing from many cultivated crops.

At least a third of the 25 million acres that is best suited to trees is under cooperative agreement with soil conservation districts, and thus is favorably situated to be managed effectively for tree production as part of a profitable operating farm. This integration of farm forests and farm woodlots with cropland uses is essential to an effectively coordinated soil and water conservation program. We can better appreciate that

this is a basic part of the total soil and water conservation plan on any farm or watershed when we remember that most of the Nation's woodland, especially in the Eastern States, is in private small ownership.

The Soil Conservation Service is not a forestry agency, but is an agency dealing with soil and water conservation problems across the board on the Nation's farms and watersheds. We recognize the Forest Service as the subject matter specialist in forestry for the Department of Agriculture. Our two agencies' joint policy is to use our respective available resources in collaboration with the state foresters, to assist State, county and local units of government as well as conservation organizations, private industry, consulting foresters, and other interested persons in helping landowners to improve their woodland conservation practices.

The resource conservation job—and the woodland conservation part of that job—is too big for any one agency, governmental or private, to do alone. It is essential that everybody work together at the job of proper use of the land and the trees or other vegetative cover that grow on it. Although the Soil Conservation Service assists farmers to plan and carry out soil and water conservation on their woodlands, we encourage those owners to take advantage of the services of private professional foresters or foresters with the State forestry departments.

The important objective, of course, is to get landowners to use woodland conservation practices, along with other needed soil and water conservation measures, on all their land. And, as experience invariably has shown, the more that farm woodland owners' interest is stimulated in this important crop, the heavier are the demands for the services of all available forestry specialists.

Timber and the other resources with which we are specifically concerned—soil, water, grass, and wildlife—are the people's and the Nation's resources, State by State, county by county, watershed by watershed, and farm by farm. Their intelligent use for maximum individual and public benefit comes down to a question of the exercise of individual and community responsibilities, and the practical application of the best available knowledge from all sources in their management. Federal assistance is made available for helping farmers and community groups to do those things they are not in position to do alone, but which clearly are in the public interest.

Dealing with any or all of these resources clearly calls for developing and making the fullest use of soil conservation district facilities. That is only another way of saying that we have to continue looking for more ways of increasing our efficiency on the conservation job in 1956 and the future—as district supervisors and cooperators, as assisting technicians, and as the whole team of cooperating local, State and Federal interests.

The need and opportunity for a concerted approach are especially evident with respect to one of the most pressing problems we face in resource conservation. That is the conservation management and use of *water*, with a train of problems ranging from soil erosion, flood, siltation, and drainage to the competition for water for irrigation, municipal, industrial, and other uses.

Water no longer is looked upon as just the primary concern of the West. It is becoming apparent to more and more people that water will become a significant limiting factor to expanding agricultural production and the growth of our entire economy in the years ahead. Water management thus will become one of our most important conservation activities from here on out. It also has become apparent that water development and management are inseparable from land management and use.

We are well aware, of course, of the mounting significance of the water aspects of conservation, including the increasingly important part that irrigation is playing in the changing agricultural pattern throughout the Southeast and other humid areas of the Eastern United States.

Take South Carolina as an example: Of the 2,780 irrigation reservoirs, 35,400 acres of irrigated water management, and 960 sprinkler irrigation systems reported for soil conservation districts to date, a substantial proportion was installed in 1955. Those figures indicated another of the continuing big jobs ahead in 1956, along with the continuation of such other water developments as the more than 10,600 farm ponds built in that State and the 618,500 acres of conservation farm drainage reported.

I was interested, too, in learning from State Conservationist Tom Buie that among the substantial amounts of their own funds that South Carolina farmers are investing in carrying out soil and water conservation practices was an estimated $1,350,000 they put into irrigation facilities and equipment alone during the first half of 1955.

I am sure you will agree that such investments to help assure the continued profitable production of the food and fiber in the amounts needed when we need them are money well spent. Anybody who lives in the South or who has traveled there over the last 20 years or so cannot fail to observe the widespread confirmation of this fact on every hand. It also is gratifying to see the reports that come through on the individual and community benefits that continue to pile up from conservation farming, particularly in the shifts that have been made from single cash crops like cotton to the inclusion of grass and legumes and livestock production.

There has been a big increase in production of sericea seed, for one, since 1954, with as much as $500 worth an acre harvested from fertilized stands, and some of it produced on land no longer suited to growing cotton or corn. Also, there was a substantial jump in blue lupine acreage over most of the Southeast. The acreages of such valuable plants as coastal bermudagrass, Bahia grass, and tall fescue are being greatly increased not only for immediate livestock consumption, but also in conservation crop rotations. And we find a like trend toward grassland farming in many other regions.

This is just one of the ways we can tackle the important job we have to do, conservation-wise, in 1956 and beyond. We have made great strides in the last two decades or so—most gratifying progress, indeed—across the land. But the scourges of water and wind erosion, soil depletion, floods and other enemies of our soil, water, and allied resources still have not been overcome to the extent they can and must be in the shortest practicable time.

These are two side-by-side headlines that splashed the front page of our Washington morning paper Christmas day: "Coastal Floods Spread; Another Storm on Way," and "Dust-Laden Winds Lash Colorado at 104 MPH." You may remember also the hurricane headlines during 1954 and 1955, and appreciate the problems of stream channel clearing, drainage, and so on that still have to be met.

These calamitous blows at our land and water resources make the headlines. Less dramatic, but nonetheless real and costly of both physical and human resources, is the year-by-year whittling away of altogether too much of our resource reserve of soil, water, grass, timber, and wildlife on the Nation's farms and watersheds. We can be proud that we have the opportunity to assist in solving some of those resource problems that so importantly affect our whole economy and welfare.

As the President said in his State of the Union message to Congress on January 5: "No other resource is so indispensable as the land that feeds and clothes us. No group is more fundamental to our national life than our farmers."

That pretty graphically sums up the challenge to all of us in this conservation field as we move into the new year. There is only one direction in which we can go—and that is ahead!

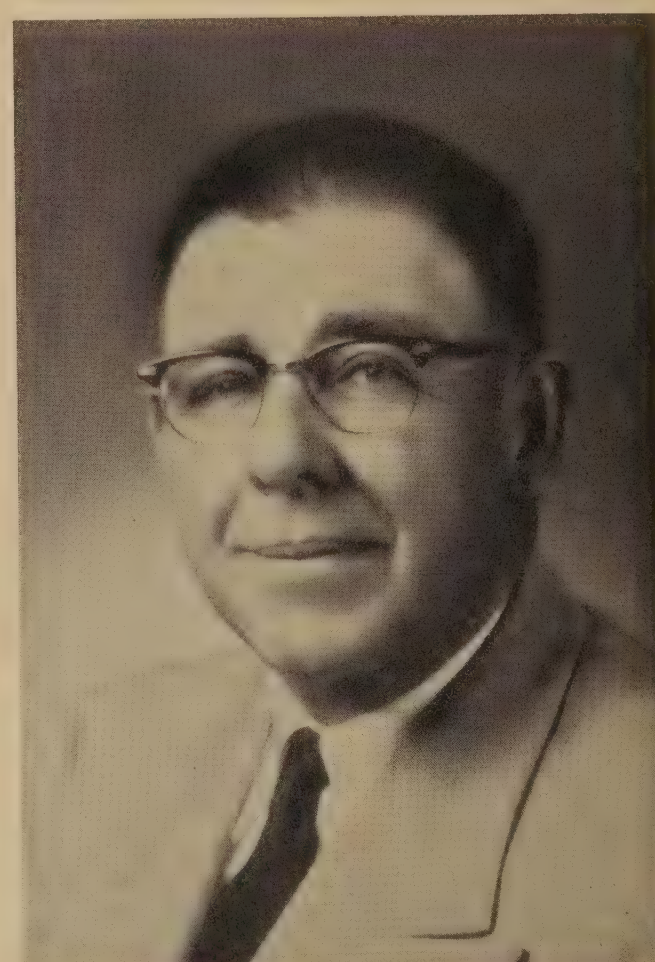
NEW PASTURE AND RANGE INVESTIGATIONS PROJECT ESTABLISHED.—The forage and range section of the Agricultural Research Service has conducted research on pastures and ranges in the West for many years. Its responsibility in this field has been considerably increased as a result of the recent transfer of certain phases from the Forest Service.

Because of the increased responsibility the forage and range section has established a new western pasture and range research project under the leadership of Dr. R. E. Wagner, research agronomist of the ARS, to better coordinate both old and newly acquired phases of the program. All pasture and range research in the Western United States that is conducted by the section is included in this project. Emphasis is given to grazing management in the Great Plains and to range reseeding, species adaptation and fertilization throughout the West. Irrigated pasture research is also a part of the project.

My Job As A Supervisor

By HOWARD GEERS

WHEN I was asked to talk on my duties as a soil conservation district supervisor at the South Dakota Supervisors' annual meeting, I readily accepted thinking that it would be an easy subject to talk about. I have been a district supervisor for about 8 years. Our soil conservation district has won the Goodyear Achievement Award. We have been made a pilot district on public lands conservation. Our district has sponsored radio programs, has shown movies on conservation, published annual reports, held tours, and carried on many other educational activities while helping our



Howard Geers.

farmers and ranchers plan and apply soil and water conservation measures to their lands. Knowing these things I thought I had nothing to worry about.

Driving home that night, after accepting this invitation, I started wondering, "What was my job as district supervisor? Had I been doing the job I was supposed to do? Were there any set rules for a supervisor to follow?"

The next morning I started searching for something that would give me a definite plan to follow in my speech. I spent 2 days going through every book and paper in my house pertaining to conservation, and I came to the conclusion there were no set rules for a supervisor to follow. I knew that a supervisor did not have to be well versed in the mechanics of conservation—that was the job of the technicians furnished by the Soil Conservation Service. The educational part was ably taken care of by our county extension agent.

I finally decided that though the duties vary greatly from district to district, there are four "musts" which I, or any other conscientious and capable supervisor, must meet.

First, my farm must be an example of conservation. If my farm is not a good example of practical conservation, I cannot talk conservation to the cooperators in my district without being reminded that my own farm is a poor example.

Second, I must be a diplomat. Diplomacy is used every day by a district supervisor. Occasionally a cooperator becomes fighting mad at the conservationist in my district. It is my job as a supervisor to get the cooperator's side of the misunderstanding along with the conservationist's story and find which one is at fault, or if both are to blame for the misunderstanding. Then comes the test of my ability as a diplomat. If I can get them together and have them part friends and still be friendly to me, I am a diplomat and a good supervisor. It is my job to keep the cooperators on friendly terms with the district, the Soil Conservation Service personnel working in my district, and keep Soil Conservation Service, Agricultural Stabilization Service, and Extension Service personnel working as a team to get an efficient job of conservation on the land.

Third, I must be a financier. My district must have enough money to pay the expenses incurred by me and the other supervisors in carrying on the business of the district. I am like many farmers; I cannot afford to give unlimited time and money. If even part of my expenses are paid by the district, I will do a better job of being a supervisor.

Fourth, I must run the business of my district. I find in analyzing some of my past actions that a great part of the work we supervisors should be doing is being done by the SCS work unit conservationist. He has all he can handle on the mechanics of conservation and applying it to the land without doing my job. It is important for the district to have a work plan each year and to follow that plan. It is easy to take the Goodyear score sheet, put down many things you plan to do for the coming year, and then forget them. If I only have one item on part of this work plan for the year and complete that plan I have accomplished something worthwhile.

Fellow supervisors, if you do not feel you have the time or qualifications to follow the duties I have outlined as "My Job As a District Supervisor," for the good of South Dakota and the Nation, resign. There is a farmer or rancher in your district who can and will do the job.

VERMONT BROTHERS IMPROVE FARM

(Continued from page 198)

"We have to put the cattle out early in the spring to keep the forage down," Eustache said. "Last spring we put them out May 7. Next spring we're going to put them out May 1, weather permitting. You've got to know when to graze your pastures. Main thing is not to let the grass get too tall and coarse."

"Best thing is that our farm is still improving," Eudore said. "Right now we need more cows to keep up with the grass growth. We've got forage and hay to spare. The way things look now, we're all going to stick to farming."

WATER USES.—Water for all uses in the United States has doubled twice in the last 50 years and is expected to double again in the next 25 years.

They Keep Them Listening

By EDWARD R. KEIL

NINE years of continuous weekly radio broadcasting on soil conservation may not be a record, but it's a long time, according to George C. Moore, management agronomist of the Soil Conservation Service in western New York, and James T. McCormick, work unit conservationist at Canadaigua who are about to reach this milestone. And they're still going strong.

It all started back in July 1947 at radio station WGVA, Geneva, N. Y. Its management set up a daily 15-minute "Farmers' Guide" feature at noon and invited agriculturists to take part. Moore and McCormick, then district conservationists, joined the show. They agreed to take turns on Monday spots. That was 450 broadcasts ago.

Reflecting on the experience, Moore says: "At first, the whole field of conservation offered a wide choice of subjects. Then, as we covered the field and the glamour of newness wore off, the chore loomed as a big and routine task. After the first year or so, however, the response of listeners showed that they did not look upon the program as routine. They told us they were getting a lot of help out of it. Their response was the inspiration we needed. Our task became easier.

"Then we had another fear. Repetition! Would we not be repeating ourselves? That fear was dispelled when we realized that life itself is largely repetitious. Then too, while the basic subject matter might be the same, there are always fresh approaches to it—new angles, new and better ways of doing something old. There is, after all, continuous variety.

The variety these two technicians get into their broadcasting is indicated by the titles of their subjects, which include such alluring titles as: Peace in Our Countryside, Winter Blankets, Running Brooks, Our Soils, Harvest Tales, Wet Weather Conservation, Good Features of a Mild Drought, Whose Water?, Snow Management, What Do You Do With Short Rows?, Are You Ready for the Next Rain?, Organic Matter From Woodchips, and Winterizing Wildlife. While the broadcasts are tuned to the current scene, the topics are announced 2 weeks in advance.

As to techniques, Moore ad libs from an outline in a live broadcast. McCormick has gone modern; he uses a tape recorder provided by the Ontario County Soil Conservation District.

For a while McCormick's main street office gave him trouble. Street noises had a way of getting onto his tapes. Then he moved to Ontario County's new agricultural center beyond the range of modern traffic din. Now he has the tapes all to himself.

"The main thing is to be sincere," Moore says. "If you don't believe in what you're saying, if you're not sincere yourself, your listeners will soon sense that. Then you've lost your audience.

Moore has ways of keeping in touch with his audience to see if he is filling their needs. Sometimes, for example, he offers booklets or bulletins to those who will write in. Another measuring device he uses is to offer to name over the radio any farmer who gets at least 90 percent of his land under winter blankets such as sod, crop residues, winter grain, or cover crops.

Another barometer to measure his listening audience is the number of invitations he re-

Note.—The author is deputy state conservationist, Soil Conservation Service, New York.

James T. McCormick doing his radio skit to a recording machine.

George C. Moore (left) and radio announcer Alex Lamutis.

ceives to give a talk as the result of a broadcast. His radio chats have led to invitations to speak at public and private meetings on such diverse subjects as safety and farm machinery. Also his broadcasts lead to requests from farmers to visit them and talk more fully on the subject of his radio chat.

Once in a while, Moore gives a series of two or three connected programs. At such times he breaks off at a critical point, just as professional performers do. He suggests that listeners write in for the additional information if they can't wait until the next broadcast.

Moore finds that humor has its place in broadcasting even about so serious a subject as soil conservation. Once, when he was discussing farm ponds, he suggested that if they were to be stocked with food fish, goldfish be kept out. If, as was his own case, someone put goldfish into the pond, then the farmer should see to it that they were in pairs.

"But," Moore asked his radio audience, "how can you tell a male from a female goldfish when you are standing on the bank of your pond?"

Moore found out. He got 200 responses. By postal card, letter, and telephone. Some answers were, as he puts it, as silly as his question. One wrote: "Whistle! If the fish turns and looks back, it's a female."

"Enjoy your work and be cheerful over the air," Moore advises. "This way, you can pass on your enthusiasm to your listeners."

Moore and McCormick view their radio broadcasts as a pleasure, a privilege, and a responsibility.

"We try to be helpful," Moore says. "The response we get indicates that we are. That makes broadcasting a pleasant task."

REVIEWS

SOIL PHYSICS. By L. D. Baver. 3d edition. 489 pp. Illustrated. 1956. New York 16: John Wiley & Sons, Inc. $7.75.

ALMOST a hundred pages of new material has been added in this third edition of Baver's well-known textbook. The additions appear as sentence- and paragraph-length inserts throughout the book where the author has noted recent developments in the knowledge of his subject. Each list of references at the end of a chapter contains several entries dated since the appearance of the second edition in 1948.

Besides the numerous additions covering recent literature, there are new sections on the practical aspects of the subject, such as those on irrigation, drainage, erosion, and soil conservation.

Soil conservationists in recent years have experienced a growing appreciation of soil physics. The physical properties of soils, no less than the chemical, influence crop yields. These properties change for good or bad in response to the various treatments of the soil. If fertility is one side of the coin of productivity, soil structure is the other.

Baver helps us to visualize the physical features of the soil and to understand their relationships. His dynamic approach is emphasized in the new edition by a reorganization of material to present the soil first "as a disperse system." In this system, "The clay and humus material are the active portions because of their high specific surface and their chemical constitution." The silt and sand fractions, he notes, "may be considered the skeleton of the soil."

In the succeeding chapters on soil-water systems, soil structure, soil air, and soil water, the character and performance of clays get primary attention. The fact that in the new edition the chapter on soil air is placed ahead of the one on soil water may indicate the author's high appreciation of the importance of structure in soil management.

Practical applications are discussed in chapters on soil irrigation, soil drainage, soils and

tillage, and soils and erosion. Considerable new material has been added to the latter chapter, especially relating to control methods using vegetation and stubble mulching. There is also a new section on wind erosion.

The book had been brightened by a more emphatic typography for chapter and topical headings. These changes alone should fully justify the new edition.

—BEN OSBORN

SOIL FERTILITY. By C. E. Millar. 436 pp. Illustrated. 1955. New York: John Wiley and Sons, Inc,, 440 Fourth Ave., New York 16. $6.75.

This is intended as a textbook for college students in soil fertility and is also valuable as a reference for soil conservationists, county agents, farm managers, and others interested in the interrelationships of soils and growing plants. Knowledge of chemistry, plant physiology, and microbiology are needed to fully appreciate this book, but the material is presented with such clarity that one need not be highly specialized in any of these fields to make practical use of much of the information.

Chapter 2 is a statement of essentials for plant growth. Chapters 3 through 12 discuss each major plant food element and the more important micronutrients with respect to their use by plants and the supply in the soil.

Other chapters are devoted to soil deficiencies, soil testing, plant and tissue testing, microorganisms of the soil, green manures, annual manures, and commercial fertilizers.

Chapter 18 gives a thorough discussion of crop rotations and farming systems. This chapter gives fundamentals and takes examples from various regions of the United States. The coverage is good but more detailed local research information is needed for specific local farm planning.

Considerable interest is added by the first chapter on the early development of agriculture and the last chapter which summarizes early field research in England and the United States.

The book is well written and reflects Dr. Millar's long experience in teaching and research. It is broad in geographical scope for the United States and is well documented with references for those interested in pursuing further any particular phase.

—R. O. LEWIS

ALFALFA SEEDED IN WIDE-ROW CORN.—Art Peterson, University of Wisconsin soil specialist, says wide-row seeding of corn with alfalfa planted between rows looks like a promising way to get more "feed value" from each acre of farmland and reduce soil erosion at the same time.

Peterson reports corn yields up to 130 bushels per acre where corn was planted in 60-inch rows, with alfalfa seeded in between the rows at various stages of corn growth. Corn yields were high for fields with either 40- or 60-inch corn rows, as long as each field had the same number of plants per acre. However, where corn rows were widened out to 80 inches, he says there was about 20 percent reduction in yield.

Farmers and farm scientists have tried several ways of seeding alfalfa in wide-row corn, but one of the best methods seems to be a combination of wheel-track corn planting and roller-seeding of alfalfa between the rows later on.

Here's the way most farmers have been doing it:

They plow the fields in the spring and plant the corn directly on the plowed ground. This means using a corn planter modified so that the corn rows and the tractor wheels are the same width. Then the tractor wheels do all the "soil packing" necessary for planting corn.

Some farmers use normal 40-inch rows with this system, while others use wider rows—up to 60 or even 72 inches. They cultivate the corn twice, then use a special roller seeder to seed the alfalfa after the corn is 18 to 30 inches tall. Some farmers remove the discs from an ordinary grain drill, straddle the corn row, and seed the alfalfa that way.

Peterson says the alfalfa usually turns out better where the corn rows are about 60 inches apart.

Seeding when the corn is only 4 to 6 inches tall may be satisfactory if the farmer uses some of the newer herbicides on the weeds. Otherwise, it's necessary to wait with the seeding until the corn has been cultivated twice, because cultivating is impossible after the alfalfa has been seeded.

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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IMPROVEMENT OF WOODLAND PAYS.—Norman Hobgood of Arkadelphia, Ark., remembers when the pine trees on his 6 acre woodlot were seeded naturally and received scant attention.

In 1921 this 6-acre field, then badly eroded and worn out, produced only 80 pounds of seed cotton. In 1922 the field was taken out of cultivation and nature seeded it to pine trees.

It was not until 1946 that Hobgood began to manage the trees as a crop. At that time, with the assistance of Soil Conservation Service technicians, he made the first real thinning. The net return from this cutting was $103.50, or $17.25 per acre on land that cost him $5 an acre.

In 1950 he netted $60 from the sale of saw logs and $25 from the sale of fence posts on the 6 acres. In 1953 he sold $21.50 worth of pulpwood. These cuttings were done on a thinning basis with Hobgood selecting the trees to be cut.

Today the once badly eroded, unproductive soil is covered with a fully stocked stand of thrifty pine trees up to 18 inches d.b.h

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FRONT COVER—Contour row grade layout of tobacco field in North Carolina.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

For the Land's Sake—Keep It Covered

A successful businessman of western Kentucky also became successful as a grassland farmer on land that was once thought to be nearly worthless.

By NORMAN TERRY

JOHN PARKS has certainly followed the Graves County slogan, "For the Land's Sake Keep It Covered," and made it practical, for the man's sake to keep it covered.

Parks has taken 217 acres of neglected, run-down land and by grassland farming methods changed it into one of the most profitable farms in western Kentucky.

Most any month of the year you drive by this farm you will see fat sleek cattle grazing the lush green pastures. In the barn you will probably see thousands of bales of hay that were produced on the farm.

John Parks took the back end of two run-down farms and changed them into a productive, profitable showplace of conservation farming. He was awarded the outstanding conservation farmer award of the Graves County Soil Conservation District in 1955.

Note.—The author is area conservationist, Soil Conservation Service, Mayfield, Ky.

Parks was reared on a 90-acre farm in Calloway County. He left the farm at 14 to work in a hardware store in the county seat town of Murray for a year, then went back to the farm for a year. By this time Parks saw a need for more education, so he went to Valparaiso University for 2 years, and worked to pay his expenses while there. The next 3 years he worked in a factory and store, saved some money and went into ten-cent store business for a year, then skating rink business for a year. Then in 1917 he went to the Army. After the war he became an automobile dealer, and has been ever since.

All this time and through all these changes the thing foremost in his mind was farming and his love of the land. So, in 1921 he acquired his first farm.

From 1931–33, after becoming a very successful businessman, the urge to become a large farmer got the best of him. Parks bought for 20 to 40 dollars per acre, on credit, 1,065 acres of thin, eroded hill land.

John Parks and part of his cattle on his grassland farm.

In the next few years these farms were paid for from dairy profits of milking 120 cows.

In 1933 Parks became one of the first cooperators with the Civilian Conservation Corps. The erosion control camp helped fill gullies, build brush and concrete dams, contour fences, contour furrows, diversion channels, and in addition to all these practices he terraced more land than anyone else in Graves County. At that time his farms were producing 20 bushels of corn and about one-half ton of hay per acre. In 1933 he started liming these fields and in 1936 started using phosphate.

By 1939 practically all this land had received the full treatment. The farm was looking good and yields of crops had more than doubled. Parks started selling land that year and soon sold all but 217 acres.

In 1941, when the Graves County Soil Conservation District was organized, Parks decided to do something with his remaining gullies and land. He called on the district and told the supervisors he wanted help to keep all his soil

Equipment used in fertilizing, liming, and reseeding pastures and meadows on the Parks' farm.

and water at home, and to get the land to producing something he could sell. First, a soil survey was made to show slope and suitable use for the land. Soon Soil Conservation Service technicians began assisting Parks in working out a farm conservation plan. Much of his land is Class IV, VI, and VII. Most of the land was planned for seed, pasture, and hay production. Outside the garden there hasn't been any cultivated row crops on this farm since 1942. Beef cattle are used to market the hay and pasture.

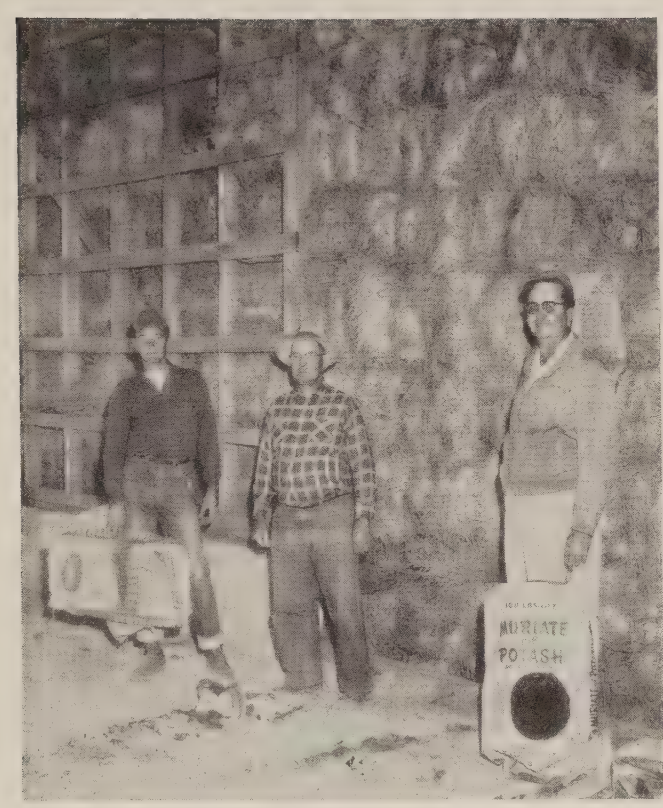
Asked why he didn't use any cultivated crops Parks replied, "I don't believe in cultivated crops for there is too much soil loss and considering this, plus the cost of treating and seeding back to grass, it is a losing proposition. Why, I only made 110 bushels per acre on my last corn crop, and that wasn't as profitable as my other fields that were producing grass and legume seed, hay, and pasture. If I could economically maintain this high yield year in and out, like they can in the Corn Belt, it would be all right, but I can't compete with Corn Belt farmers in growing row crops."

In 1955 Parks grazed 170 head of cattle while producing more than 34 tons of hay, 300 bushels of wheat, 975 bushels of oats, 4,000 pounds of Ky-31 Fescue seed, 9,000 bales of hay, 600 bales of straw, and 4,000 pounds of Kobe lespedeza seed on his 217 acres. Last, but not least, 10 acres of this farm are 10 to 25 feet deep in water for livestock, irrigation, and fish production. More than enough fish and vegetables are taken from the ponds and garden for three families, so, many fish are given away to friends, and over $1,000 worth of vegetables a year are sold from the irrigated garden at the local market.

Parks says he gets four crops a year from some fields. For example, in 1955 he harvested oats from a 15-acre field, baled the straw, cut the Kobe lespedeza for hay, and later combined the Kobe for seed. Most Kobe fields in the county that were cut for hay that year didn't come back and make additional growth due to the drought, but this field, being high in organic matter, plant food, and water holding capacity snapped right back and was 8 to 10 inches high before it was combined.

Asked how he has been able to get these outstanding yields from land that was once so poor he replied: "I didn't do it by myself, Billy McReynolds, now in the Army, helped me 4 years. Joe Nolin, has now been with me for 3 years. Then the CCC Camp, Soil Conservation District, and Soil Conservation Service technicians have helped and guided me since 1933 in making my plans and establishing my conservation practices."

Of course he doesn't talk too much about clipping his pasture and using the weeds for bedding, which with the cattle produce more than 400 loads of manure a year. He seldom mentions using a tractor and scraper to put 6 inches of topsoil back on a steep hillside, or



Part of the 9,000 bales of hay produced on the Parks' farm in 1955.

terraces and diversion channels used on all fields to conserve soil and water, plus initial treatment of all land with 3 tons of lime and 200 pounds of 62 percent phosphate, and the top dressing of all fields each year with 200 pounds per acre of 4-12-8 commercial fertilizer and 100 pounds of 33 percent nitrate, 100 pounds of 62 percent phosphate, and 100 pounds of 60 percent potash, and other soil conserving and improving practices. This year in his white clover and grass fields he is drilling one-way rye grass and fescue, then is going to cross drill a mixture of oats and wheat. His next project for more conservation and production is irrigation of hay, seed, and pasture lands.

John Parks truly loves his land for he is on it every day and is daily doing and searching for ways to stop all erosion, conserve and best use all the water available, and to make the land even more productive and profitable.

Parks was the 1952 winner of the City Farmer division of the Save and Enrich Our Soil Contest, Memphis, Tenn., but even though he is a successful businessman he should not be classed as a City Farmer for he loves his land so much he now spends practically all his time out on the land, not in town.

Graves County leaders and farmers for many years have used the slogan, "For The Land's Sake Keep It Covered." John Parks has done this very profitably for 13 years. During the whole time, dry years and all, he has had a surplus of roughage feed, and one year produced more than 30,000 pounds of fescue seed.

TIMBER A PROFITABLE CROP.—Rex Ramsey of Nashville, Ark., has proved that pine timber is a profitable crop, even when started from "scratch." In 1940 Ramsey planted an old eroded 10-acre field to pine seedlings in accordance with his conservation farm plan worked out in cooperation with the Mine Creek Soil Conservation District. In 1950, just 10 years later, this pine plantation was ready for its first thinning. The timber was carefully marked and pulpwood removed from 8 acres. The other 2 acres had suffered fire damage and were not thinned. Pulpwood cut from 8 acres brought $150. Max Bolar, SCS woodland conservationist, recently cruised this plantation and made the following estimates:

Saleable timber products per acre

	Value per acre
20 cords pulpwood @ $4	$80.00
280 fence posts @ $0.06	16.80
	$96.80

Products to be removed in stand improvement cut

5 cords pulpwood @ $4	$20.00
120 fence posts @ $0.06	7.20
	$27.20

The total value of the saleable timber now present on this plantation is $96.80 per acre, which means that this 10-acre block has made Ramsey $7.65 per acre every year since it was set in pine. This timber is just now reaching the stage of growth that will produce saw logs and higher returns. Ramsey isn't going to sell out and take his $96.80 per acre because he knows that the value of his timber will increase much faster during the next 15 years than it has in the past 15. However, Ramsey will thin this plantation as suggested by Bolar and take a partial payment of $27.20 per acre on his investment. The remaining trees will be left in better condition for faster growth.

LONG-DISTANCE USE OF MAPS.—Commenting on the use of conservation plan maps, Ed. Small, manager of Cherokee County Farms, near Gaffney, S. C., which are owned by W. B. Camp and Sons, Inc., of Bakersfield, Calif., said, "We use our conservation plan maps to keep records in our California office on the Cherokee farms. Duplicates of these maps are kept at both places and in our correspondence we refer to the field numbers and land use practices."

Conservation Workshop for Teachers

By Ivah Green

"I'VE lived on a farm all my life and knew about conservation practices on the land, but I didn't realize, until I attended this workshop, how much more than that conservation really means."

"I've always been interested in conservation of our natural resources, but until I took this course I had never been aware of its terrific importance from so many angles."

These two comments were chosen at random from 22 evaluation sheets written by elementary teachers on the final day of attendance at the conservation education workshop at Doane College, Crete, Nebr. The evaluations were requested, but not obligatory; they were unsigned.

In summing up the values of this workshop, we found these factors most important: The teachers attending had acquired a great deal of knowledge in a short time (11 days); they understood the urgency for conserving all natural resources; they recognized the close interdependence among all natural resources; and they achieved a new awareness of the spiritual aspect of our resource heritage.

Note.—The author is director of the conservation workshop at Doane College, Crete, Nebr.

Workshop students listen to soil scientist discuss gully erosion.

Ivah Green

The Doane College workshop in conservation education was started in 1950. It has been continued for six consecutive years. The seventh will be held in the late summer of 1956.

More than 150 elementary teachers have attended the Doane College workshops, a third of them sent there on scholarships provided by various conservation-minded agencies, mainly soil conservation districts and the Izaak Walton League. But implement dealers and service clubs also contributed funds toward scholarships. After attending the workshop the teachers spread out into their local communities, prepared and eager to do something about teaching (and preaching!) conservation of our natural resources.

The influence of such teachers is illustrated in a statement by Robert Mann: "Training a

teacher to teach conservation may be likened to energizing an induction coil—she attracts and motivates the generations of pupils that come within her magnetic field."

Each day's procedure for the 11-day workshop session was somewhat similar and yet varied enough to keep interest high. The 22 participants of the 1955 workshop listened to excellent lectures, and were taken on field trips closely connected with the lectures. They viewed the finest films and filmstrips which provided extra visual evidence for many of the ideas they received through lecture and trip. They browsed lightly and read widely in many books, periodicals, and pamphlets, chosen for their particular contribution to the fields in which the majority of the teachers had expressed interest.

Lectures and field trips included the following topics: Soil Structure; Land Classification and Use; Building and Holding Soil; Grasses and Legumes; Home Woodlands and Windbreaks; Wildlife Management on Farms; Irrigation Farming; Crop Rotation; Watersheds; and Gun Safety and Law Enforcement.

While the general pattern of conducting the Doane College workshop varies but little from year to year, the 1955 workshop did inaugurate two innovations: land judging and airplane touring. Both were successful enough to warrant their inclusion in the 1956 workshop.

The land judging practiced by 4-H boys and girls and FFA students is a fairly well known procedure for acquainting young people with a knowledge of soil, and the ability to appraise its characteristics and use capability in a farm planning operation.

For elementary teachers, some of whom had never heard the term before, land judging was a rather formidable assignment. But it took no more than four excellent speakers to give the basic background information necessary for a trial run in land judging for the workshop students. A concentrated course, surely, but definite and simply told, and illustrated with a variety of demonstrations which made the procedures less confusing.

Lloyd Mitchell, a soil scientist from the University of Nebraska, made soil structure and soil profiles meaningful. Two SCS work unit conservationists, Dexter Hawes of Beatrice and Ed Fitzgerald of Wilber, explained the reasons for, and the meaning of land classification. J. V. Cain, county agent from Wilber, cleared up some of the vague ideas about crop rotation and fertilizers. Evan Hartman, former extension specialist from the University's College of Agriculture demonstrated with water and various kinds of soil the meaning of light soil, heavy soil, organic matter, permeability, structure, and so on.

A soil conservationist explains and demonstrates some points to students of the Doane College Conservation Workshop in an outdoor classroom.

The first ventures in land judging followed the lectures and demonstrations. Students assembled at pits dug in different fields, and in a 103 degree temperature attempted to put into practice what they had learned so recently. While scores were far from perfect, no one seemed to find that as important as the fact that each had actually taken part in an activity which called for expert knowledge and good judgment. Land appraising, and use of land according to its needs and capabilities took on new values in their eyes.

A demonstration of water intake and runoff on different kinds of land by the Doane College Conservation workshop students.

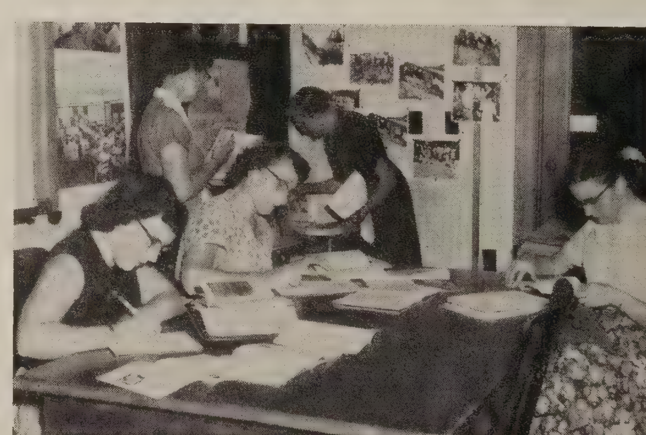
"Watershed" was a vague term for many of the workshop students. While a few may have thought a watershed was a shed that housed a pump, others knew a little more but not much more about the real concept of the word, and still less about "watershed management."

When those teachers learned about the recognition given to Nebraska throughout the nation because of her pioneering in watershed management, the whole idea of watersheds took on greater importance. A capable speaker, Richard Tenhulzen, SCS representative, told how the Service works with the Salt-Wahoo Watershed Association. He gave a forceful talk about watersheds, and supplemented his remarks by showing the film "Valley Of Still Waters." Both helped considerably to lay the groundwork for the understanding necessary for students to see a subwatershed in operation on the ground. After the ground tour, they flew, two and three to a plane, over the whole subwatershed area.

In between the various activities which made up the workshop program each day, the teachers prepared materials for their own classrooms—a unit of work for a specific grade or grades. Individual interests in choice of subject showed up strong here, resulting in such topics for study as: All About Grass, A Homesite for Woody, Stocking a Farm Pond, Holes in the Ground, Schoolground Beautification, Saving the Whooping Cranes, The Water Cycle, The Value of Quail, and The Corn Borer: Its Damage and Control.

Each unit had to be based on stated concepts desirable for pupils to know. Each unit had to lead out with a written introduction in first person which would arouse the interest and curiosity of pupils sufficiently to cause them to ask questions that would result in study. Also included was a list of community resources important for study and suggestions as to how integrations might be made with other fields of subject matter commonly taught in the elementary classroom. Furthermore, there was a culmination of the unit in a manner that should prove to an interested audience the value of the study. Then, the unit contained a list of references, including films and filmstrips which the teacher expected to have accessible for her pupils when the unit was launched.

Not only did the writer of each unit gain value from the writing, but she was given time to present her unit in whole or in selected parts before the entire workshop group. Thus each member was given a look into 21 different units of study by which she could profit in case she wished to do similar units in her own classroom.



Teachers prepare study units for next year's classes while attending workshop.

Tree Girdling In Arkansas

By MAX D. BOLAR

SOMETHING new has been added to the soil conservation district program in southern Arkansas—the contract business of girdling cull and weed trees with mechanical girdling machines.

One of the first mechanical tree girdling contractors in the State was "Hap" Brotherton of Hope who commenced this service in the Hempstead County and Nevada County Soil Conservation Districts.

Brotherton is also the tree planting contractor for the Hempstead County Soil Conservation District. He plants almost a million trees each year. He purchased a mechanical tree girdling machine to keep himself employed between planting seasons. "Hap" and the girdler make an "Eager Beaver" combination with a record of girdling several thousand acres of cull and weed trees during the past year.

Note.—The author is woodland conservationist, Soil Conservation Service, Hope, Ark.

Other contractors became interested in girdling in the southern Arkansas counties. At present, they are operating in at least 15 Arkansas soil conservation districts—and the girdling service is rapidly spreading to other districts in the State.

The purpose of tree girdling is to kill trees that are slow-growing, diseased, or defective, and thus release desirable, faster-growing species from competition with the undesirable trees. For example, blackjack oak, which is overtopping or competing with pine, is girdled to make way for the fast-growing pine. The girdling operation has often more than tripled the board foot volume increase in pine and has saved the pine stand from stagnation.

"Hap" Brotherton of Hope, Ark., using a mechanical tree girdler on a cull tree.

Contrary to the belief of some, the girdling operation is not for the purpose of "declaring war on the hardwoods"—girdling can be used just as effectively to help the more desirable hardwoods. A number of farmers and woodland owners are finding that hardwood forests may be improved by girdling cull and weed trees to make way for high-grade hardwoods.

Soil Conservation Service personnel in Arkansas found that the job of promoting timber stand improvement by girdling or otherwise eliminating cull trees, seemed to be bottlenecked. While many farmers and woodland owners agreed that there was a definite need for this woodland improvement work, they lacked the time or physical ability to do the work with an ax. The mechanical tree girdler can operate about four times faster than a good man with an ax, and the cost is only about 3 to 5 dollars per acre.

The mechanical tree girdler cuts a 1-inch wide band around the tree to a depth of slightly more than a half-inch. On bottom land and moist sites there is a tendency, as with ax-girdled trees, for the tree to sprout or to bridge over the girdle. Sprouting can be controlled by painting the groove with a mixture of 2-45T and old crankcase oil.

REGRASSING WIND-ERODED LAND

The Normans of Seminole, Texas, find that planting good grass on their sandy, blowing fields is more profitable than planting cultivated crops.

By W. S. Goodlett

USING land for the purpose to which it is best suited is paying off in more ways than one on the 19,520 acre Flying N Ranch in Gaines and Andrews counties in West Texas where wind erosion is a serious problem.

Youthful George Norman, Jr., who took over management of the ranch when his father died, has learned that reseeding of old cultivated fields to blue panicum and lovegrasses not only eliminates soil blowing, but also protects his cattle against being poisoned by grazing shinnery, a type of small scrub oak.

The elder Norman started building the Flying N Ranch in 1943, buying numerous tracts of range land and several old cultivated fields, eventually creating two units, one of 6,080 acres and the other 13,440 acres.

Cotton, grain sorghums, and other crops had been grown on the sandy cultivated fields, so the elder Norman continued to farm them until drought set in and blowing started. He realized that he needed assistance in solving the wind erosion problem, so he became a cooperator of the Gaines County Soil Conservation District in 1949.

In 1950, weeping lovegrass was planted on 70 acres, and sand lovegrass on another 65 acres. These pastures were grazed from February 1, 1951, to March 15 by 124 cows and 60 calves. The pastures were rested until April 24 and then were grazed by 100 cows and 50 calves until July 26. Good gains were made by the cattle without supplemental feed. From July to December around 12 to 15 cows were grazed. The grass made no seed, but the cattle came off in good condition.

Drought really set in in 1952, but the pastures provided grazing for 100 cows and 50 calves from April 1 to June 15 and 54 cows and 50 calves were grazed from June 22 to July 17. Although there was little rain and the grass was grazed short, 1,900 pounds of uncleaned seed were harvested from 40 acres of blue panicum.

The elder Norman was so well pleased with results from the grass in controlling erosion and providing feed, that in 1952 he made additional plantings of 250 acres each of weeping lovegrass and blue panicum on dry land, and 55 acres to blue panicum on irrigated land. However, about 50 acres of the dry land blue panicum were blown out.

Note.—The author is area conservationist, Soil Conservation Service, Big Spring, Tex.

In 1953 there was less than eight inches of rain, most of which came late in the growing season, so the dry land grasses didn't do very well and little grazing was provided.

Two rains, one of about 2½ inches in September of 1953 and the other of about 3 inches in April of 1954 got the grasses off to a good growing start. On April 26, 1954, 148 cows, 5 bulls, and 75 calves were put on the regrassed lands that had been divided into 5 separate pastures. The irrigated pastures were given an additional 3 inches of water. He started grazing these cattle on a 165 acre block of weeping lovegrass. They stayed in this pasture for 2 months and came off in very good shape. There was still a good growth of weeping lovegrass when they were moved.

On approximately 200 acres of the dryland blue panicum, he harvested 22,000 pounds of seed and on about 400 acres of dryland weeping lovegrass, approximately 100 pounds of seed were harvested. These grasses were grazed after the seed was harvested. The grazing Norman's cattle got from his revegetated land, enabled him to give all of his native pasture land a much needed rest during the growing season. This allowed the native grasses to make a comeback following the drought.

In July 1955 Norman planted approximately 800 acres more of blue panicum. One field of 240 acres was washed out by a heavy rain but the rest came up to stand. He plans to replant the washed out field and additional acreages this year and eventually have all of his cultivated land in grass.

The program now provides for grazing pastures in rotation at the rate of three cows per acre for one week. "This type of operation not only is proving profitable in providing livestock feed, but also is eliminating wind erosion damage on the regrassed sandy land," young Norman points out.

George Norman, Jr. (left), ranch owner, and Len Dugan, SCS conservationist, discuss possibilities of a weeping lovegrass pasture on the Norman ranch.

"Another highly important feature," he says, "is the fact that the introduced grasses green up earlier in the spring than do the native grasses. This furnishes grazing for the cattle during the spring when the shinnery on the range land is budding."

The shinnery, which infests the sandy range land, buds in the spring before the native grasses become green. The buds have a heavy content of prussic acid, which is fatal to livestock. Cattle will graze the shinnery, since there is no green grass in the early spring, and hundreds are fatally poisoned annually. Norman recalls that they lost 45 head of cattle in 1952 from shinnery poisoning.

(Continued on page 232)

Part of the cattle herd on the Norman ranch.

Rainmaker Helps Prove a Theory

No. 14

This is the fourteenth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By FRANK RAUZI and A. W. ZINGG

GOOD stands and high production of grass on the range help maintain good stands and high production.

Where there is good vegetation, any type of soil can resist erosion and absorb torrential rainfall better than where vegetal conditions are poor.

The facts are now available to support these statements.

During the past 5 years a portable rainfall machine has been used to get these facts about rangelands of the central and northern Great Plains. More than 900 manmade rainstorms have been applied in making the studies. These tests have been conducted over a 7-state area from the northern Rockies across the Plains to the Flint Hills of eastern Kansas. Different kinds of range with wide contrasts of cover conditions have been sampled.

Note.—The authors are, respectively, soil scientists and soil conservationist, western soil and water management section, soil and water conservation research branch, Agricultural Research Service, Laramie, Wyo.

The range on the left had an intake rate of nearly 3 inches of water per hour while the one on the right had an intake rate of about 1.2 inches per hour.

Portable rainmaking machine used to determine soil-intake rates of water on rangeland.

Research on the water intake rates of rangelands has been done through a joint effort of the Agricultural Research Service and the Soil Conservation Service cooperating with the State Agricultural Experiment Stations. Home base for the rainmaker is at the University of Wyoming, Laramie, Wyo. Locations on which the machine is to be used are scheduled each year. Existing fence line contrasts between cover and range conditions are located by range technicians and soil scientists of the SCS. Data are then obtained on tours with the rain machine by personnel of ARS.

The rainfall applicator is mounted on a truck that can be taken almost anywhere cattle and sheep can graze. Water is pumped from a tank and sprayed on a drip screen at a height of 8½ feet above the site being tested. Originally, forming drops of the right size and spacing was a problem. It was solved by placing muslin cloth over three-fourth inch chicken wire. When water is sprayed on the muslin, it is caught in small pockets over each screen opening. Yarn

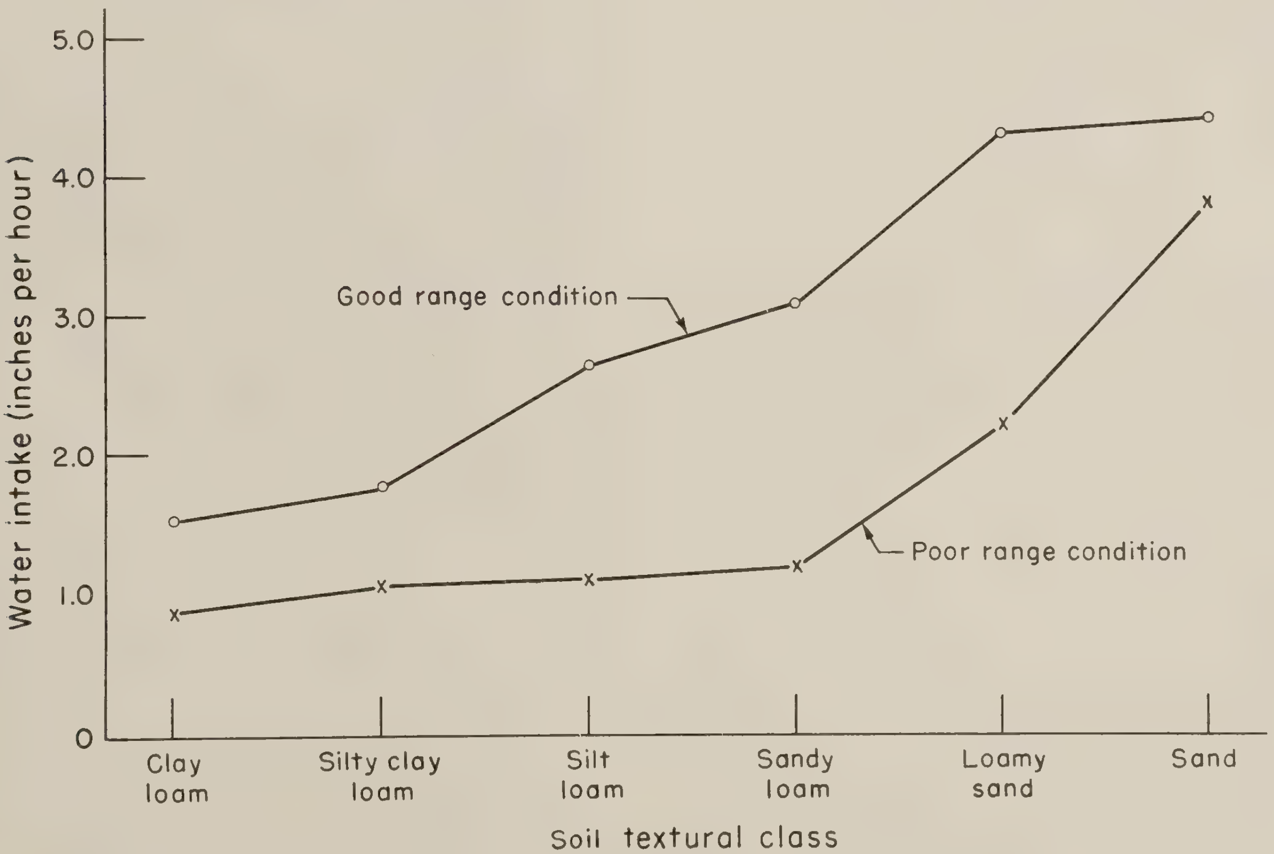
is attached to the muslin to protrude through each hole in the wire. Water accumulates on the yarn to form raindrops. A canvas prevents the wind from deflecting the rain, and the water falls on an area of 13 square feet. A 2-foot square metal frame is driven into the ground near the center of the area of the "storm," and measurements of runoff are made from it. "Rain" is normally applied for 1 hour. The amount of water going into the soil and the amount of runoff are measured at the end of 30 minutes and again at the completion of the 1-hour test. Usually the amount of water applied is 3½ inches. Rates as high as 5½ inches have been used on coarse sand.

Ranchers sometimes laugh about the unusual research device and call it a leaky silo or a portable shower. However, there is nothing funny about the results obtained. The data are of great value in determining how much moisture can be conserved and used for greater grass production while providing erosion protection to the vast expanses of range in the Great Plains region.

Metal frame and spout that measures difference between water applied and runoff.

The chart below shows the differences in water intake found on soils of different textures. It shows that the average intake rates on heavy soils of either clay or silty clay loam are relatively low. The rate of water intake is increased appreciably, however, even on these heavy soils when they have good grass cover. For me-

(Continued on page 240)



Effect of range condition on water intake of different kinds of soil in the central and northern Great Plains.

TRIPLE PURPOSE DITCHES

The McCabes use the same ditches for drainage, surface irrigation, and sprinkler irrigation.

By WILLIAM R. RATLEDGE

THERE'S a big argument on at the service station in Selbyville, Del. Emory McCabe, Sr., and his son started it when they said they could make their farm ditches do triple duty: (1) drain, (2) irrigate and (3) cut operating costs. The argument is spreading as water "experts" look the ditch system over. Doubters are weakening as the evidence begins to support the McCabes.

The Summer of 1954 was as dry in Selbyville as in the rest of the country. So the McCabes joined with the nation's farmers in a swing to irrigation. They already had drainage ditches. Young Emory came up with a novel idea. "Dad," he said, "we've got our main ditches already. All we need is a good well and sprinkler equipment. Then we'd be fixed to irrigate."

The McCabe ditches were dry most of the 1954 summer. One of the hurricanes, however, produced enough water to fill the ditches and let young Emory test his idea. He held an irrigation demonstration with a portable pump. The McCabes found that a sprinkler system could be set up in minutes anywhere within their 50 acres of blueberries and on almost 50 acres of other crops.

By the time a threat of drought arrived in the spring of '55, young McCabe had his complete water control and distribution system in operation. He had drilled a 10-inch well, 118 feet deep, rated at better than 1,000 gallons a minute. He had installed a vertical turbine pump to deliver up to 600 gallons a minute to the ditches.

Note.—The author is a Soil Conservation Service technician engaged in watershed work in Delaware and Maryland.

They are not ordinary ditches that the McCabes have. They are big ditches with a capacity of nearly 2 cubic yards per foot. But what is more, they are equipped at the outlet ends with creosoted water control structures. Flash boards can be added or removed to permit either storage or drainage of water.

The McCabes don't recommend using ditches for main irrigation lines everywhere. In their case, however, ditches are necessary for water control. Putting the ditches to work as water reservoirs and distribution channels was a natural.

By using the ditches as main lines the McCabes figure they are saving a lot of money since they can reach nearly 100 acres with only 300 feet of 6-inch main line irrigation pipe. They also figure a big saving in power, pump, and operating costs because of limited pressure loss in the main line.

Emory S. McCabe, Sr., watches underground water flow through a movable pipe from a pumping station into his drainage-irrigation ditch.

Pumping underground water from well into drainage ditch for irrigation.

Since the farm is normally well supplied with moisture during the growing season, the irrigation system is designed mainly to produce quality fruit and to get young nursery stock off to a good start. A centrifugal pump which operates from the power-takeoff of a small tractor is large enough to provide 1 acre-inch of water every 10 days to the 50 acres of blueberries when the sprinkler system is used.

The McCabes increase efficiency by eliminating the sprinklers in the older berry plantations. They can do this because blueberry culture develops a ridge and channel with the bushes on the ridge. The channels are developed at right angles to the drainage-irrigation ditches so that excellent surface drainage results. The McCabes have built aluminum baffle-boards that fit the contour of the ground between rows. These "boards" serve as dams to permit flooding between the rows thus avoiding the need to move pipe as required for the sprinklers. Flooding also puts the water where it is most needed—at the roots of the plants.

The senior McCabe's interest in water control began 20 years ago when he bought the swampland farm just as the Civilian Conservation Corps finished cleaning out the Sandy Branch tax ditch near Selbyville. He found that the black soils would produce excellent corn and soybeans if they did not flood during summer storms. The new main ditch held out fresh hope for flood relief. It promised some field drainage but not enough to permit use of the heavy farm machinery which was rapidly replacing the mule and hand labor.

After 10 years, Emory, Jr., joined his dad in the farm enterprise. The father and son team had heard that blueberries would grow best on wet acid ground well supplied with humus. Blueberries sounded like the answer to their water troubles. The neighboring woodlands were full of wild varieties and outsiders were reported seeking soil similar to that of the McCabes for berry production. They were supposedly tolerant of wet feet all winter, resistant to summer flooding, and even able to endure hot dry weather.

Yes, blueberries would tolerate all of these things and the soil would produce good fruit. But the McCabes were interested in making a living and even a profit from the land and the blueberries. Profit demanded more than mere tolerance; so the McCabes set out on their water control venture.

In 1947, E. S. McCabe and Son became cooperators with the Sussex County Soil Conservation District. With the help of Soil Conservation Service technicians, they developed a drainage plan using parallel ditches to remove excess water. The idea that blueberries liked wet feet so persisted that they installed only part of the plan. More than that, they sandbagged the ditches shut during the summer months to prevent loss of water. Thus began their first effort at mechanical water control.

During the next 2 years, the McCabes noticed that the blueberries adjacent to the deep ditches

Pumping water from drainage ditch to irrigate field crops.

were making excellent growth while stunting was taking place in other parts of the fields. As a result of this evidence the McCabes installed a series of parallel drains. The soil conservation district helped with the job. The McCabes built more than 3 miles of ditches just like the neighbors' cropland ditches.

The McCabe ditches, however, soon became different because each ditch serving the blueberry fields was fitted with a concrete pipe at the discharge end. They installed a flap gate over the pipe opening and cut a hole in the top to serve as a "drop inlet." The flap gates allowed the ditches to drain in the winter and permitted water storage during the spring and summer.

In 1954 the McCabes began tinkering with their water control structures again. The concrete pipes with the hole on top worked all right but the diameter of the pipe limited the amount of water held. Last year there was little rain after the gates were closed and the "held" water soon seeped into the ground. The McCabes tailored the ditches for new water-control structures of creosoted timbers keyed into the banks. The structures were equipped with flash boards so that the water level could be held at any desired depth or drained.

What's the argument about? The McCabes contend that holding water in the ditches helps control the water table under the blueberries. Others say that the practice has little effect on the movement of water in the soil. Some of the neighbors think like the McCabes; they have made plans to install control structures in their ditches.

There's also an argument about water loss from the ditches. The McCabes don't fear great loss of water by evaporation because the water surface is protected from wind action. They are aware of possible heavy seepage loss in midsummer after the normally high water table drops. They think that trapped runoff will more than make up for seepage loss. The answer to this question will come this summer if rain is as scarce as it was last year or if it is poorly distributed.

The McCabes see other advantages to keeping the ditches filled at some seasons. Flooding helps control the growth of weeds in the ditch bottoms. They can also control some of the water weeds by drainage at certain seasons, if necessary.

The SCS technicians working in the Sussex County District are being called in again to help out on a couple of technical problems. The McCabes have built their water-control structures with much leeway for fear of storm damage. They want to know the maximum height of water they dare hold in the ditches with their flashboards. They are also curious to hear what the technicians have to say about the lateral movement of water from the ditches into the fields and from the fields into the ditches.

The McCabes are sure of two things: (1) ducks have begun pitching in their ditches and muskrats are burrowing in the ditch banks; so the farm wildlife is increasing; (2) if all of the farms on the main drainage ditch used water control structures similar to theirs, there would be less flood damage along the main stream during high runoff storms.

In the late spring, the McCabe farm is a study in contrasts. The drainage ditches in the corn and soybean fields are at work removing water to encourage deep rooting of the plants. In the bearing blueberry fields, the ditches are held two-thirds full to maintain a high water table. In the fields newly set in blueberries, irrigating sprinklers are drawing water from ditches and the ditches in turn are being recharged with water from the well.

Triple purpose ditches? At least that and maybe more. Who knows what the McCabes will do next?.

REGRASSING WIND-ERODED LAND

(Continued from page 227)

"When a rancher in a shinnery-infested area doesn't have pastures for his cattle in early spring, then he must do one of two things," the young rancher explains. "He must put his cattle on expensive feed until the danger from shinnery buds is past, or he has to leave them alone and take a chance on losing some of them."

The Flying N herd was considerably reduced during the drought years, but is being expanded in proportion to the feed provided by the pastures, Norman says.

Research and Operations—Technicians Get Together

By M. L. DuMARS

FARMERS, and the technicians who help them, are constantly on the lookout for more economical ways of draining land. In areas where irrigation is new, farmers and technicians are asking themselves what type and size of irrigation system they need, if any, to fit their weather, soil, available water supply, and desired cropping system.

From those general questions stem thousands of specific, technical problems that have to be answered one way or another by the farm planners, county agents, engineers, and soil scientists who help the individual farmers and groups who decide to invest their money in new systems or improvements for drainage or irrigation.

To make sure the answers provided by the Soil Conservation Service are the latest and best that experience and scientific research can provide, operations and research technicians have to keep in close touch with each other through writings, individual contacts, and technical conferences.

Engineers and soil scientists responsible for both operations and research in the eastern part of the country (along with a few from the West) met in Chicago last December. The conference was planned and conducted jointly by the Soil Conservation Service and the Agricultural Research Service. Conference leaders were Tyler Quackenbush and John Sutton, irrigation and drainage engineers of the Washington SCS staff, and T. W. Edminster and M. D. Thorne, drainage and irrigation research projects, eastern soil and water management section, ARS.

Some principals in the SCS-ARS conference are (left to right): Cecil H. Wadleigh of ARS and C. J. Francis and J. C. Dykes of SCS.

A somewhat similar session for the West was held in Denver early in 1955, and another western conference is now being discussed.

What did the Chicago conference achieve?

First there was forward-looking discussion of the advances being made in the field of soil-water-plant relations and in the application of climatological data to drainage and irrigation problems.

Then in separate sessions on drainage and irrigation, the conferees took up detailed reports of the work being done, problems of applying the findings in actual farm situations, and recommendations for future research. Round table discussion of each item assured all participants the opportunity for complete understanding.

Note.—The author is ARS-SCS liaison officer, Plant Industry Station, Beltsville, Md.

Comparing notes at the SCS-ARS drainage-irrigation conference are (left to right): Tyler Quackenbush, Marlowe Thorne, John Sutton, and T. W. Edminister.

Sutton sums up the conference results for SCS drainage men like this:

"Getting our men together with the ARS men for 3 days of detailed discussion of the research work underway and of our research needs was most valuable. Aside from the important matter of getting better acquainted with the work being done, it gave us an opportunity to look at and discuss data not yet ready for publication—in other words, it was a look at 'things to come.' This gives us a chance to make better plans for the future.

"Of greatest importance, however, the drainage engineers came up with a list of 15 drainage research needs which should have top priority These will, no doubt, be of value in developing future recommendations for research.

"Not all the advances in drainage practices come through formal research. Many improvements take place by progressive farmers trying a new method and finding it successful. But we need the help of research men in observing, analyzing, and publishing such improvements as come about through farmers trying out new practices."

Edminster agrees that the drainage research program should be strengthened to answer SCS research needs. He points out that many needs will be at least partially met by research projects now underway.

Edminster further comments on the meeting:

"An outstanding example is a new project being initiated at North Carolina to study, under controlled conditions, the exact drainage requirements of various crops under different soil and climatic conditions. This will be a direct answer to our requirements for an improved basis upon which drainage designs may be developed. The recently established project in New York in which new subsurface drainage materials and installation practices are being studied should provide important information to enable us to reduce the cost of drainage and thereby increase efficiency in farm operations.

"The Chicago meeting provided a means of assuring ourselves that research and operations were on common ground and in full agreement as to the nature of the problems under study. The detailed discussions also resulted in each group having a better appreciation of how research data are being applied to field problems and where there is need to obtain new data or modify old data to more fully meet these problems.

"It was particularly gratifying to all the research men to find how closely their program objectives and plans coincided with the more pressing research needs as presented by SCS. It seemed obvious that the men in both Services were keeping in close contact with each other to the point where there were common points of view."

In Thorne's opinion, the results of the conference will be found in future research. He says: "We have received some fine suggestions for changes in and additions to our irrigation program and have been enlightened considerably on the problems of application of our data. This comes early enough in the program for Eastern irrigation that the suggestions can be readily incorporated in future work. It has been gratifying to get assurance from the SCS people that the work we are doing is that for which they have urgent need."

Quackenbush feels that the conference aided materially in speeding up the application of research results to the farm.

"Before research findings can be applied to the farms of the United States on a wholesale basis," he points out, "it is often advisable to make further limited studies on a field trial basis. As a result of the Chicago meeting, several items were brought to the attention of SCS personnel that are now ready for field trial studies. Plans were made for the Soil Conservation Service and the Agricultural Research Service to work closely together in carrying these research findings from the plot to the field trial stage of development.

"The personal contacts and discussions with the researchers who are getting the answers for us were certainly beneficial and should greatly facilitate exchange of information and ideas in the future."

J. C. Dykes, SCS assistant administrator who took part in the conference, sums up his views in customarily succinct language: "We need to do more of this."

A Long Time and a Lot of Work

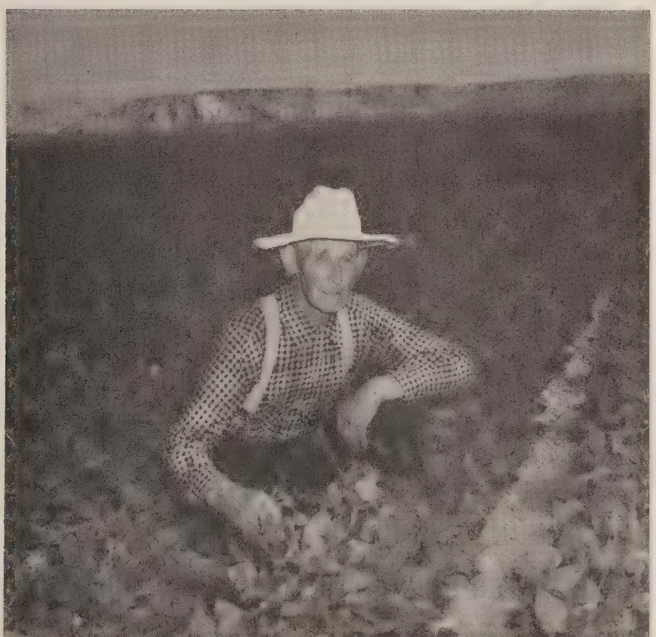
It took the sponsors of the Agrarian Canal Irrigation Project 37 years to reach their objective, but they made it.

By AMOS L. OLESON and C. KEITH MILLER

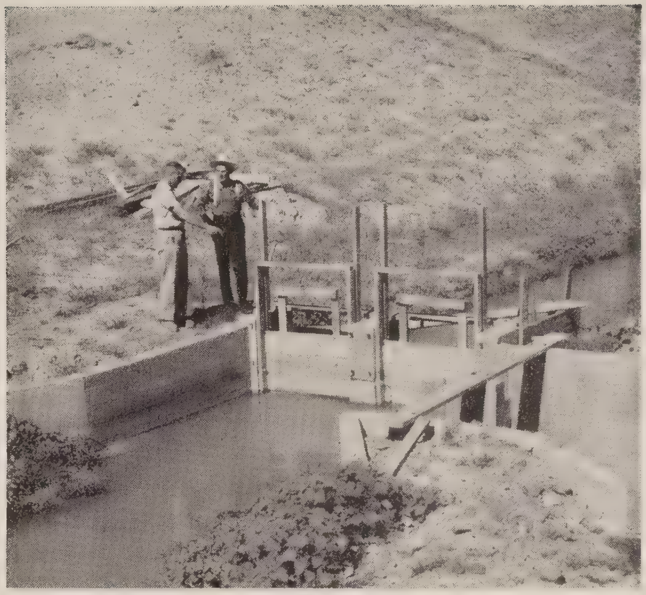
"IT took a long time, a lot of hard work, and plenty of determination, but it's a success now and we don't have a big debt to be paid off in the future," declares J. G. Davis of Emblem, Wyo., when he refers to the Agrarian Canal Irrigation Project.

The project is about 8 miles west of Greybull, Wyo., and includes 1,622 acres of former desert land which has been developed for irrigation.

Note.—The authors are, respectively, work unit and area conservationists of Soil Conservation Service at Greybull and Worland, Wyo.



J. G. Davis inspects a field of beans he and his son, Jonathan, raised on land irrigated by the Agrarian Canal.



A combination headgate-wasteway structure on the Agrarian Canal.

Davis and his son Jonathan, own and operate 162 acres in the project area, in addition to a farm on the Emblem Bench. Davis is generally recognized as "father" of the project. He has seen this land developed from an area of salt sage, prickly pear, and scattered sagebrush into a prosperous irrigated section where yields of 6 tons of alfalfa, 20 sacks of beans, or 70 bushels of barley to the acre are common.

"We had a rough time during the early years," Davis says, "but since the organization of the Greybull Valley Soil Conservation District and with their help under the group enterprise procedure, we think we have our problem licked. The technical help the SCS technicians cooperating with the district have given us in planning, laying out, and constructing our irrigation canals and system has been invaluable."

Davis recognized the possibilities of the project soon after he settled on the Emblem Bench in 1908, but it wasn't until 1918 that he was able to interest enough people to organize the Agrarian Canal Company and file the necessary application for a permit to appropriate water. The source of water is Dry Creek, an intermittent stream that drains part of the Emblem Bench, an irrigated section 4 miles west and the location of Davis' original homestead.

The original application included 2,100 acres, 896 acres of which were Carey Act lands and the remaining 1,204 acres homestead filings.

Davis is the only remaining settler of the original 10 applicants.

Construction of the necessary canal, involving 7½ miles of ditch, was started in 1918. Work was done mostly with teams and scrapers during the late fall and early spring each year until 1930. The settlers were all farming on the Emblem Bench, which took most of their time during the growing season. A used dragline was purchased in 1931. During that spring and summer construction of the canal was completed. The first water was delivered in 1932, but because of drought and canal problems there was enough water for only two farming units. During this period many of the original applicants became discouraged. They either sold their interest in the Carey Act land or defaulted on their homestead filings.

From 1933 to 1937, only the Martin Fiene unit was farmed intermittently. In 1940, however, a storage reservoir known as the Sushine Reservoir was completed. This assured an adequate supply of water for the Emblem Bench and, as a result, a more dependable supply for the Agrarian Canal Project.

Encouraged by the increased water supply the remaining settlers broke out additional acreage and worked with renewed vigor. During the middle of the growing season in 1941, however, there was a complete failure of a wooden flume carrying the entire supply of irrigation water across a large gully. The resultant loss of the entire crop caused the abandonment of dwellings and cessation of all activity on the project.

"Things were at a low ebb during this period," Davis recalls. "Especially in 1946 when Mrs. Wamhoff, one of the settlers, was notified she had to prove up on her homestead that year or it would revert to the government."

In order to prove up on the homesteads the land had to be broken out and farmed. This required an adequate source of water. "Well," says Davis, "we got all the interested people together and held a council of war. When we discovered that technical assistance was available from the Soil Conservation Service through the Greybull Valley Soil Conservation District, which had just been organized, we were elated. The Agrarian Canal Company was reactivated. We decided to complete and rehabilitate the entire project."

The company applied to the supervisors of the district for technical assistance under the group enterprise procedure. Complete surveys were made by SCS technicians. Cost estimates were drawn up and a 5-year plan of construction was agreed on.

In the fall of 1946 the canal company made an $8 an acre assessment on all irrigable land and entered into a contract for the construction of almost 3 miles of additional canal and an 18-foot cut to replace the wooden flume. Construction was completed late in 1947. In 1948, the settlers were back in business, in a limited way it is true, because the canal company ruled that only 25 percent of the land could be cultivated the first year. This limitation was be-

Some of the equipment owned and operated by Greybull Valley Soil Conservation District

cause of the need for more work on the canal. The SCS technicians also recommended that only a part of the project be broken up each year to avoid creating severe wind erosion hazards.

In 1949, a contract was let for reconstruction of another 3½ miles of canal, which completed the project. The canal company raised the limit to 50 percent of each unit that could be cultivated in 1949.

Today, the project includes 1,014 irrigable acres and plans have been made to add an additional 608 acres. These lands are owned and operated by nine families. The cost of developing the project to date is approximately $30 an acre.

Increase in production through irrigation of these former arid lands has been a benefit to the Greybull community in many ways. It helps provide a stable income for the settlers, the schools, churches, businessmen, and others in the Greybull community not only for the present but for the future.

Drainage Pays In Wicomico District

By Morris R. Nichols

"WITHOUT drainage ditches we can't farm this flat country," according to Thomas C. Calloway who farms on the Eastern Shore of Maryland near Salisbury.

The number of Eastern Shore farmers who feel the same way is growing year by year.

Calloway started his drainage program about 3 years ago. He has two more years work ahead to complete his drainage system. He has invested about $6,000 in drainage work and land clearing on his 280-acre farm.

Calloway used to get around 25 bushels of corn an acre. Now he gets about 75 bushels. "We used to think we were doing something when we got 8 to 10 bushels of soybeans an acre," he said. "Now we're not satisfied with less than 25. And the beans are of much better quality. Production is up at least a third all along the line."

Besides corn and soybeans, Calloway raises truck crops, hogs, and sheep. As part of an overall soil conservation program, he thinks drainage is of most importance on flat land, like his. He and his young son Bill plan to maintain their drainage system carefully once its general design is completed.

In the past 5 or 6 years, George and Joe Davis have invested nearly $10,000 in draining their farmland near Salisbury.

Note.—The author is work unit conservationist, Soil Conservation Service, Salisbury, Md.

"Drainage is the best investment we have on our farm," George Davis said. "Already we have our entire investment back."

The Davis brothers raise corn and soybeans. In 1954 they won second place in Wicomico County with a corn yield of 85 bushels an acre.

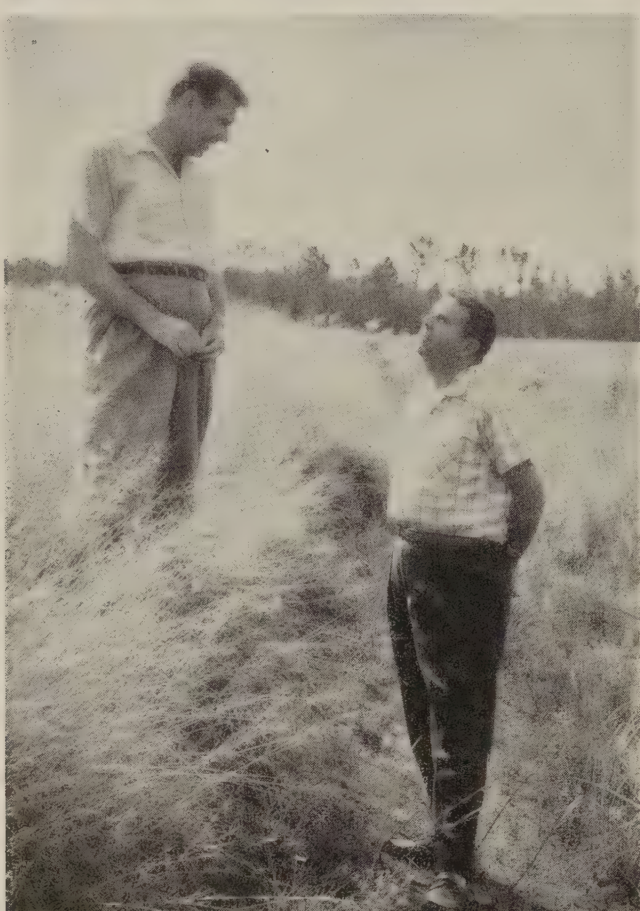
They have drained about 150 acres. They have cleared brush and worthless trees from 50 acres of wet land as part of their drainage work.

"We haven't lost a crop since draining the land," George Davis said. "The previous owner used to lose his crop 3 out of 5 years."

District-owned dragline clearing drainage ditch.

"You can't grow corn in water," says Linwood E. Richardson who farms at Willards with his son Glenn. "We used to dig ditches with a spade. Surveyed the land by eye to determine where and how deep the ditches should be dug. Of course the ditches weren't very good. They didn't do the job right. Today Soil Conservation Service engineers lay the drainage system out with us. So, it's done right. A modern dragline owned by the Wicomico Soil Conservation District does the work.

"Before we put in drainage, farming was more of a gamble than it needed to be. We could never be sure of getting into some of our fields. Maybe we'd get a little crop, maybe we wouldn't get anything. Now production is up and it's dependable. Yields will still vary with the weather to some extent. If there is a long and heavy downpour, with high winds, we can expect yields to drop. There's bound to be some damage. But under normal conditions, our corn yield is up 50 percent. Our soybeans have increased 10 to 15 bushels an acre."



George Davis (left) and his brother Joe discuss the condition of vegetation in a drainage ditch.

Drainage ditches in the Wicomico district attract wildlife.

These Maryland farmers protect their drainage investment by applying related conservation measures. These measures include soil-improving crops to maintain fertility and good soil structure. As farmers who are taking part in the conservation work of their soil conservation districts, they receive technical help from the Soil Conservation Service.

Soils of the Eastern Shore around Salisbury are generally poorly-drained loams and sandy loams of the Pocomoke and Fallsington series.

Let's hear some more from the farmers.

"With drainage, we can grow better crops," Calloway said. "We can plant the crops earlier in the spring. We can keep them in. No more washouts. No more drowning. No more failures because the land is too wet to harvest the crop. Last fall, after one of those hurricanes, we had 10 inches of rain in 24 hours on ground that was already wet. The ditches carried it all off. Without drainage the beans would have been ruined. Without drainage we couldn't raise enough corn around here to fatten a billy goat."

Calloway runs his ditches into a creek on his property. He can drain his whole place without waiting for neighboring farmers to take action

on an interfarm outlet.

Part of the farmland owned by the Davis brothers had drainage ditches installed long ago.

"The ditches ran every which way," Joe Davis said. "Each ditch was dug to drain a small area. One ditch had no relation to the others. Besides, they were seldom taken care of properly. They were cluttered with weeds and brush. So in 1950 we started our present drainage system."

"We had one 16-acre field that had never grown anything," George Davis said. "We couldn't even get into it, it was so wet. Since we cleared and drained it, we've had full soybean production.

"Altogether through clearing and draining we have brought 50 acres into production that were not producing anything. Drainage has brought into sure production 50 acres more which had been questionable—maybe you'd get a crop and maybe you wouldn't. Drainage has greatly improved another 50 acres. Per-acre yields are rising as the drainage system nears completion."

To date in Wicomico County about 365 miles of new drainage ditches have been dug. They help more than 18,000 acres of cropland. Surveys show that 729 more miles of ditches need to be dug to bring the county's farmland into top and dependable production. This estimate includes 13 existing natural waterways that need to be improved. The needed improvements include clearing, grading, and enlarging ditches and natural waterways, and maintaining a road along the ditches in swampland.

These additional 729 miles of ditches would benefit more than 33,000 acres of the county's farmland.

WATER HELPS.—B. C. Fitch, a cooperator with the Florence (S. C.) Soil Conservation District, made 105,000 pounds of tobacco on 49 acres in 1955.

He said: "I would not have irrigated a single time even if I had been equipped for it because I had a perfect growing season. But last year, after two dry years, has convinced me that I can make a good yield of tobacco whenever I put down the fertilizer and have water at the right time." Fitch is going ahead to set up for irrigation when he needs it.

REVIEWS

TOMORROW'S BIRTHRIGHT. By Barrow Lyons. 424 pp. 1955. New York: Funk and Wagnalls Company. $5

The author designates this book as: "A Political and Economic Interpretation of Our Natural Resources." That seems to be a satisfactory, concise description of the contents. Though considerable space is devoted to discussing technological developments in resource use and some historical data on resource use and abuse is given, the main emphasis is on the economic and political problems involved, especially those of the 20th century in the United States.

Barrow Lyons had long and varied experience as a journalist before spending nearly 20 years in Federal Government service. He seems to have drawn on all his experience and contacts in assembling the impressive information set forth in this book.

The entire field of resource use and conservation is covered, including soils, timber, wildlife, water, minerals, fuels, etc., though some resources are given more space than others.

One of his main contentions is that proper development, use, and conservation of most natural resources will be determined largely by the turns taken in our political and economic systems as they evolve within the next generation. Obviously, the author thinks that more central government control of basic resources is needed. Yet, he tries to give a fair presentation, sometimes by quotes, of the case for those who think most resource development and use should be left in the hands of private enterprises.

Much of the contents of this book is argumentative. But even the augumentative hypotheses advanced are thought provoking to those interested in the conservation movement.

This is a book that most students of conservation will wish to read and keep as a reference, if only because of the wealth of factual material that has been assembled.

—Tom Dale

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WHAT IS GEOLOGICAL EROSION?—Last year's flood damage in Massachusetts and Connecticut strongly impressed us with the idea that geologic erosion is a cyclical rather than a constant process. Geologic erosion is that wearing down of river valleys, formation of stream terraces, and so on, that occurs—man or no man. Up until 1955, we had got used to things as they were and it looked as though geologic erosion was just history. In fact, one wondered how our landscape got so carved up if nothing ever happened to it.

Now the situation looks more logical. The floods of August and October 1955 cut some stream channels 3 feet deeper, filled up other channels, and created new ones. They laid down deltas of stone and gravel, destroyed some bottom land fields, caved in hillsides, and spread blankets of new soil on the flood plains. In one brief 2-month period, more changes were made in the earth's surface here than in the preceeding 50 years.

But that's not all. The gigantic power of the floods upset protective equilibriums which had withstood smaller storms. Swept away were the natural stone check dams and the gravel stream channel linings. Banks, which had sloped and covered themselves with sod and shrubs, were undercut by the torrents and torn away. It will take a long time for our drainageways to stabilize again, and meanwhile we can expect a period of geologic erosion. These channels will stone themselves up again and nature will heal the scars until new floods start a new cycle. We can expect geologic change to recur in cycles until watershed protection and flood prevention measures blanket the area and the cycle is broken at the flood stage.

—William F. Warren

CONSERVATIONIST ELECTED TO NATIONAL OFFICE.—John D. (Danny) Freeman, area conservationist of SCS for northern Arizona, headquartered at Prescott was elected president of the American Society of Range Management for the current year. He is a charter member of the society and has been active in many ways for several years, particularly in the Arizona Section.

Freeman was born and reared on a farm near Tulia, Tex. He entered New Mexico College of Agriculture and Mechanic Arts in 1931 and upon graduation in 1935 took a job as junior range examiner with the Soil Conservation Service at Safford, Ariz. Since then he has worked continuously in range and soil conservation work in Arizona, New Mexico, Colorado, and Utah.

SURVEY OF HUNTING AND FISHING.—The first national survey of economic aspects of hunting and fishing got under way Jan. 7, 1956, when agents of the survey firm of Crossley, S-D Surveys, Inc., began personal interviews with hunters and fishermen. The statistics gathered will provide the first accurate nationwide measure of the sports of pursuing game and fish, in terms of number of persons taking part and the amount of time and money spent. The survey will be supervised by the U. S. Fish and Wildlife Service.

The total contribution of hunting and fishing to the nation's business turnover has been estimated variously from 5 to 11 billion dollars annually. In the past, figures on the number of hunters and fishermen have included only those who bought licenses. In many places minors and old persons are exempt from license requirements; in several states, landowners may hunt or fish on their own property without licenses; and salt water fishermen are not licensed in any state except California.

The survey will report on hunting and fishing during the calendar year 1955. The primary objectives are to determine (1) the number of persons, by age, sex, and licensing, who hunted and/or fished for sport, (2) the amount of time spent on these sports, and (3) the amount of money spent (including all expenditures for items connected directly with hunting or fishing).

RAINMAKER HELPS PROVE A THEORY

(Continued from page 229)

dium- to coarse-textured soils ranging from silt loam to loamy sand the amounts of intake are more than doubled by good ground cover.

The intake rates common on coarse-textured soils such as sand are relatively high, and the increases from improvement in range conditions are relatively small. However, on coarse sands vegetative cover is almost a must for protection from both wind and water erosion.

Hence, it is apparent that good range management that maintains a good ground cover will nearly always produce more forage and check wind erosion.

SOIL CONSERVATION

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SOIL CONSERVATION

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

DONALD A. WILLIAMS
ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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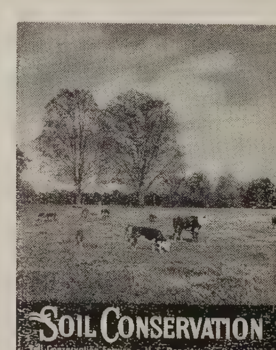
OUR SOIL ★ OUR STRENGTH

ANTI-POLLUTION CAMPAIGN.—The pollution committee of West Virginia Sportsmen Unlimited, Inc., has launched a new campaign against stream pollution in that State which has some teeth to it. It is distributing a striking and easily understood poster, and the excellent booklet "Modern Sewage Treatment." More important, it has added a new and potentially effective device to get corrective action by the State where needed.

The committee is supplying dual printed postcards at cost to all 215 chartered outdoor clubs in the State. They are addressed to the State Water Commission on one half and addressed to Governor Marland on the other. The cards are for reporting details of stream pollution cases noted by members.

A PROFITABLE TREE CROP—W. M. Glass of Prescott, Ark. planted 5 acres to pine seedlings in 1942. In 1953 he made his first thinning and sold more than $250 of wood products. He still has a healthy and growing woods.

Editors are invited to reprint material originating in this magazine.



FRONT COVER—Dallisgrass, bermudagrass, and white Dutch clover pasture in Louisiana.

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Fairfield County Stages A Comeback

By HENRY F. CAUTHEN

FAIRFIELD County, S. C., is a land of almost revolutionary transformation, and the change—all of it for the better—is still in process—spreading over the hills and through the valleys.

It can all be defined by three words beginning with the letter "P"—Pines, Pastures, and Ponds. From this triumvirate has come a condition described by another word beginning with "P"—Prosperity.

A day spent driving over Fairfield can be a day of gratification for the South Carolinian interested in the development of his State—even for the man who is not a farmer.

Recently I spent the better part of a day driving over the county. My host was R. M. Blair, farmer and soil conservation district supervisor. Mr. Blair drove me over lands which show the transformation from the poverty of eroded lands to the prosperity of pines and pastures.

Here plantations were operated by his ancestors, and others, before the Revolutionary War. There are still some relics of that era and many of the period between the Revolution and the Confederate War. When the antebellum plantation system went out in Fairfield, and later when cotton declined, lands were deserted and tragic erosion set in. Indeed, the county became famous for its gullies and the disappearance of its topsoil.

Today, men such as Mr. Blair can look with satisfaction to a Fairfield that still shows many of the scars and other evidences of erosion, but that also has thousands of acres of rolling pastures, which feed beef and dairy cattle and grip the hillsides and defy erosion. And where pasture grass isn't protecting the sloping lands, terracing and other modern soil practices advocated by the men of the Soil Conservation Service is "catching" and holding the land.

> In 1928, H. H. Bennett and W. R. Chapline wrote in a publication entitled "Soil Erosion A National Menace" that in Fairfield County, S. C., erosion had ruined 90,000 acres of land and rendered it suitable only for growing trees and grass. In 1934, the condition of the land was probably worse.
>
> If Bennett and Chapline were to return to Fairfield County today they would hardly recognize the countryside. The change, says Henry F. Cauthen, managing editor of the *Columbia Record*, can be attributed to pines, pastures and ponds.
>
> Recently Mr. Cauthen spent a day in Fairfield visiting the farms in the county and talking to farmers, bankers, businessmen, and others. The information he gathered formed the basis of a series of three stories which he wrote for his paper. Excerpts from the stories make up the profile of Fairfield County as it is today. The condensation of Mr. Cauthen's stories in this article is being run with Mr. Cauthen's permission.

Any day in Winnsboro a common sight is truck after truck loaded with pulpwood and heading for the big woodyards. Much other pulpwood moves directly from assembly points on the rail lines in other parts of the county.

From the sale of its pine Fairfield is deriving a revenue of more than a million dollars a year. The dollar mark is now on the pine tree. Men here have seen it pay off. They know it will continue to pay off, and they are cutting the trees scientifically. They are planting seedlings, too.

Leaders in Fairfield County give full and warranted credit to two groups for what has happened here in the last 20 years—the men of the Soil Conservation Service, with their know-how, and the men of the big paper companies which buy the pulpwood. The influence of the groups has spread to individual farmers as had the sound leadership of the SCS.

H. E. Johnson, cashier of the Merchants and Planters Bank of Winnsboro, joins many others

Pasture scene in Fairfield County.

in recognition of the good and widespread results of the guidance which the men of the SCS have brought to Fairfield.

There are 447,000 acres of land in Fairfield County. More than 300,000 acres are in woodlands. It is estimated that about 308,000 cords of pulpwood were cut and sold in the county last year, with the proceeds exceeding a million dollars.

Under the impact of this, land values have of course gone up. A minimum of $50 an acre is being paid for cutover woodlands. Good pasture land (if you can buy it) runs much higher. The Fairfield farmer, bolstered by the continuing demand for pine, the steady demand for milk and beef, and confident in his know-how in both fields, is a strong, substantial man today, not worried about the future—and the commerce and general economy of the entire county reflects his healthy condition.

You can stand on a high point on Dave Crawford's cattle farm in Fairchild and see from there almost 500 acres of pasture, broken only by ponds and undulations of the land.

Fairfield's economy is now one of beef cattle, dairying, and pulpwood. Thousands of acres of its once severely eroded lands have been reclaimed for cattle farms. On some graze Fairfield's dairy cattle, and on the others Herefords, and other breeds of beef cattle.

Almost every inch of Mr. Crawford's farm is covered with grass. At the bottom of some of the slopes are the clear-water ponds which provide water for his cattle. The water in the ponds is entirely surface water that flows down to them from the grassed slopes.

On the drizzling afternoon I visited the farm, Mr. Crawford was found seated in a truck watching wild ducks move in to light on his ponds. You could see some of the understandable pride of Mr. Crawford in these magnificent grazing acres.

(Left to right) M. R. Frierson, George B. Hagood, and B. Y. Palmer examine a bundle of seedling pines soon to be planted in Fairfield County.

All over Fairfield today are fine pastures. There are 27 Grade-A dairies in the county. These dairy farms must, of course, have fine pastures. With the able assistance of the men of the Soil Conservation Service, the dairy farmers have excellent programs going to maintain good pastures and to grow feed for winter feeding.

Good pastures must have water for the cattle and there are now 339 ponds in Fairfield, which

is not a large county. SCS men helped design 99 ponds in 1955. This indicates ponds are being provided at a higher rate per year than ever before.

Since the depression of the late 1920's and early 1930's, Fairfield has been virtually made over agriculturally. Cotton production has dropped from an average in those years of about 30,000 acres a year to 5,000 acres in 1955.

In 1955, it is estimated that Fairfield's income from agriculture was procured as follows:

Pulpwood	$1,000,000
Dairying	800,000
Cotton	750,000
Beef cattle	600,000
Turkeys	250,000

This comes to 3.4 million and does not include miscellaneous income from the sale of hay and grain and other crops. It shows, however, the principal sources of the healthy farm income of the farmers today.

The men of the Soil Conservation Service look with as much pride and satisfaction on the achievements of the revolution as do the farmers themselves, and these farmers are quick and vigorous in their praise of these men and of the whole idea of the soil conservation program.

By late afternoon on the day of our visiting of farms we arrived at the home of S. D. Cathcart. He is also a district supervisor and an authority on dairy and other farming in the county.

Mr. Cathcart has been in on soil conservation work since 1935, when the CCC began improving lands in Fairfield.

"It's been a great thing for Fairfield," he says of the work of the SCS.

All over the county there has been improvement and the improvement is continuing. There probably is not a better example in the State, of men accepting new farm concepts, going to work on them, and making them succeed.

You can see the effects not only on the lands, but in the houses and barns.

And the Merchants and Planters Bank reflects it impressively. As late as 1937, the resources of that bank stood at approximately $750,000. Today its total resources are more than $3¼ million. There it is—in cold figures —the best evidence of a great agricultural transformation.

Some leaders of the Fairfield County agricultural revival: (left to right) G. M. Ketchen, George B. Hagood, S. D. Cathcart, William Jeter, and H. E. Johnson.

Soil is Key to Range Capability

By ROBERT W. EIKLEBERRY

DIG a hole and draw a crowd! If you want to interest a landowner, get out with a spade and start shoveling dirt in one of his prize pastures or problem fields. If he sees you, chances are that he will stop what he is doing and come out to talk. His first question may be, "Looking for oil?—or maybe uranium?" Yes, the soil is a common meeting ground for scientist and layman.

Out here in the Great Plains range conservation has moved a long way since 1940. One of the reasons has been a better knowledge of soils. Range conservationists used to talk mostly in terms of vegetation types, density, palatability, and forage-acre factors. Today, they talk in terms of range soils and the condition of the vegetation in relation to its potential. "Range site" and "range condition" are familiar factors to successful ranchers. The two go hand in hand in determining the range capability now and in the future. Proper stocking is best determined by knowing both the site and its vegetative condition.

To determine range capability, the plant scientists and soil scientist must work together. A good range conservationist must be a student of soils. Conversely, in the range areas, a good soil scientist must have considerable knowledge of plant ecology. Frequently, it is impossible to determine the climax vegetation which should be on a specific range out here in the Great Plains without knowing the soils. For example, many people believe that a solid cover of buffalograss on the deep, medium-textured loess soils in the 15- to 19-inch rainfall belt of the Northern Plains is natural. Well, it isn't. Buffalograss should make up less than 10 percent of the natural vegetation on these soils. Western wheatgrass (*Agropyron smithii*) is the dominant grass on these soils when properly managed and on range in excellent condition. Adjacent deep sandy soils may be covered with sand dropseed and blue grama, but little bluestem and prairie sandreed should make up over 75 percent of the composition on these soils. To determine range condition under native vegetation, you must know the soil and the climate in relation to the kind and composition of the grass that grew there originally.

During the past few years, E. J. Dyksterhuis and Ralph O. Lewis, range conservationist and soil scientist, respectively, have worked closely together on this problem in the Northern Plains States. Comparable teams of range and soils men have worked on similar problems in the Mountain States, the West, and the Southern

Note: The author is soil correlator, Soil Conservation Service, Lincoln, Nebr.

Good cattle on sandhills range. The small lake showing at the left is typical of this area.

Choppy sands range site. Left, poor condition; right fair condition.

Plains. They have arrived at a set of interpretive groupings in which they can place the soils studied to date. These groupings within each climatic belt are called range sites. A range site is a combination of soils and climate that produces a certain kind and amount of native vegetation. Only soils which normally produce native pasture can be classified into range sites. Here in the Northern Plains, each of the soils can be placed in one of the following range sites:

WL—WET LAND: Subirrigated land with water table at or close to the surface part of the year but not open-water marsh.

DS—DARK SANDS: Sands having a thick, black humic upper soil because of favorable subsoil moisture, but water table seldom closer to surface than 18 to 36 inches.

Ov—OVERFLOW (formerly called Lowland): Areas regularly receiving additional moisture from higher land—stream overflow and run-in from higher slopes, and areas with water-spreading systems.

SL—SALINE LOWLAND: Overflow or subirrigated land affected by salt accumulations.

Sa—SANDS: Deep, loose, coarse-textured soils predominantly sand on gentle slopes.

Sv—SAVANNAH LAND: Uplands that originally supported isolated trees in natural grassland. Soils supply more and deeper soil moisture than average for the climate because of high intake at the surface and commonly also a slowly permeable layer several feet below. Bedrock is never near the surface as on the "Very Shallow" site, which also may support stunted trees rooted in joints of bedrock.

Sy—SANDY: Normal sandy loams and loamy fine sands.

Sl—SILTY: Normal loams, silt loams, silts, and fluffy clay loams.

Cl—CLAYEY: Normal clays and compact clay loams.

Cp—CLAYPITS: Areas where hard clay lies close to the surface in shallow pits which occupy more than 20 percent of the area.

CS—CHOPPY SANDHILLS: Deep, loose, coarse-textured soils, predominantly sand, with abrupt slopes of 20 percent or more.

St—STONYHILL: Deep, thin soils with much loose rock on strongly to steeply sloping outwash or hilly land. Stoniness—not bedrock or gravel—makes tillage of intertilled crops impractical.

Sw—SHALLOW: Soils having at least 10 inches of soil but few roots penetrate deeper than 20 inches.

TL—THIN LOESS: Shallowly developed loess soils on slopes of 20 percent or more.

TB—THIN BANKS: Poorly developed mixed soils derived from various parent materials that outcrop at different levels forming irregular slopes of from 20 to 65 percent. Trees may occur locally on outcrops. (If desired, breaks generally over lime-

stones may be designated Thin L Breaks, and over sandstones as Thin S breaks.)

Gr —GRAVEL: Uplands in which rock fragments of gravel size are so abundant in and on the soil that a sharp-pointed spade cannot be forced into the soil. Included are some river terraces and outwash deltas.

VS—VERY SHALLOW: Soils where few roots can penetrate deeper than 10 inches, but usually with some joints in bedrock that develop deep soil pockets. These joints are usually marked by tall grasses, shrubs, or trees. Included is most scoria land but not shale outcrops.

SU—SALINE UPLAND: Upland soils with excessive accumulation of salts. Common only in arid climates.

Sh —SHALE: Uplands where shales are exposed at the surface and little, if any, soil profile development is evident.

Bl —BADLANDS: Rough, broken lands with intermingled grazable areas too small or too narrow to justify separate consideration.

These 20 groups of range soils can occur in 5 rainfall belts and through changes in latitude as roughly divided by boundaries of States from Texas to North Dakota. Thus, they provide an opportunity to recognize up to 500 different kinds of range sites.

This looks like a large number of different kinds of rangeland on which to make recommendations. But let's take a look at one large range county in Nebraska. Cherry County has been covered by a recent standard soil survey in which all the soils have been classified into range sites. There are 39 soils occurring in this county. These 39 soils were grouped into 10 range sites. The rangemen then prepared a table of suggested stocking rates by site and condition classes. This shows the number of acres required per mature cow for the 6-month grazing season or equivalent for each site in its present condition. These range sites and stocking rates are summarized in the table below.

By determining the range site, and then observing range conditions on the area in the field, the range planner can recommend the appropriate starting stocking rate for any given piece of land.

The dominant grasses of an area under climax usually consist of four or five kinds. Our present knowledge and experience indicate that on most rangelands in the United States we can expect to get the greatest production over a long period of years when native pastures are maintained as near as possible to a climax cover of grasses. In order to do this, there are some definite principles of range management that must be followed. These requirements are

Range sites and stocking rates, Cherry County, Nebr.

Range site	*Dominant grasses when range is in excellent condition.*	*Stocking rate by condition classes; acres per mature cow, 6-month period.*			
		Excellent	Good	*Fair*	*Poor*
Wet land	Bluejoint reedgrass, prairie cordgrass	3.5	4.5	7.5	15.0
Subirrigated	Switchgrass, Indian grass, big bluestem	5.0	7.0	11.0	22.0
Overflow	Big bluestem, western wheatgrass, switchgrass	7.5	10.0	15.0	30.0
Sands	Switchgrass, prairie sandreed, sand bluestem, little bluestem	10.0	14.0	20.0	40.0
Sandy	Little bluestem, prairie sandreed, needle-and-thread, sand dropseed	10.0	14.0	20.0	40.0
Silty	Western wheatgrass, blue grama, green needlegrass, needle-and-thread	10.0	14.0	20.0	40.0
Choppy sandhills	Prairie sandreed, sand bluestem, sand lovegrass, little bluestem	12.0	16.0	24.0	48.0
Shallow	Blue grama, dryland sedges, needle-and-thread, sand dropseed	12.0	16.0	24.0	48.0
Thin breaks	Little bluestem, prairie sandreed, side-oats grama, stony hills muhly	15.0	20.0	20.0	60.0
Very shallow	Blue grama, dryland sedges, junegrass	30.0	40.0	60.0	120.0

quite simple, yet rigid. These four principles are briefly listed as follows: (1) Proper number of livestock, (2) uniform distribution of grazing, (3) proper season of use, and (4) proper kinds of grazing animals.

In areas of "annual range" the application of fertilizer has proved successful. Here is where the range conservationist and the rancher sit down and plan a program of grazing management for the ranch. The range conservationists of the Soil Conservation Service have been very successful in using this approach. In some places, where soil surveys have not been made, the range conservationist has been trained to recognize the soils well enough to make a range-site map. The Soil Conservation Service has found that looking at range vegetation is not enough. We must first know the soil to determine what kind and how much vegetation it will produce. Soils and climate are the key to successful range conservation. We must know the soil in order to know if the present vegetation reflects potential productivity or if it is merely a stage in the deterioration of a native pasture.

An Artist Becomes a Conservationist

By JACK L. BARRICK

MISS Elizabeth Whipple, an art teacher at Salem College, W. Va., first heard of the Salem Watershed protection project at a club meeting. Since then, she has used her talents to promote this project.

When she learned that drawings were needed to illustrate a brochure to tell the public about the watershed project, she volunteered her services. The results were certainly attractive, as you can see from the samples shown here. She learned of this need from a college associate, Harley Bond, who is a director of the Upper Tenmile Watershed Association and is also treasurer of West Fork Soil Conservation District. These organizations cosponsor the Salem watershed project.

Note.—The author is work unit conservationist, Soil Conservation Service Clarksburg, W. Va.

Floods.

Before long, the cleverly illustrated brochure "Action on Salem Fork" was ready for public distribution. Farm and town dweller alike in the Salem area read the story. They learned of ways to share in the work and cost of the project. After reading the brochure, townspeople better understood that only action was needed to bring about a reduction of damages from floods. Farmers could foresee added values through more intensive use of soil and water conservation practices on their land.

Miss Whipple says that one reason she was especially interested in doing the drawings for the brochure was to see if she could develop a technique for drawings that would reproduce well when reduced in size and printed by inexpensive methods. She used scratchboard for all but 1 of her 6 drawings. Realistic drawings with an appeal to the average reader, yet stylized enough to apply to almost any West Virginia area, were her aim.

Conservation.

Miss Whipple, dean of women at Salem College, attended the Cleveland School of Art for 5 years. She majored in portrait painting. While she likes portrait and still life painting best, her art interests are many and varied. Thus, she undertook to draw six conservation sketches for the watershed brochure.

Harley Bond was her main source of information on conservation and watershed questions. After a field trip to a few points of interest Miss Whipple became "very much interested in any project that will improve and enrich our community." She added, "I think the Salem watershed project is more helpful and promising in that respect than anything else we have undertaken here in years."

Elizabeth Whipple.

Miss Whipple believes that drawings are especially useful in soil conservation work. She explained: "They show expected results, slightly idealized. One might have to wait several years before photographs could show the same results." She emphasized that an artist can point up some special aspect of the work which might be hard to show in photographs. "Drawings can't take the place of photos, but can supplement them," she remarked.

Conservation on the Bluestem Hills

An oil field worker and his energetic wife rejuvenate 440 acres of depleted land in the Bluestem Hills of Kansas and build a good way of life while doing so.

By JAMES G. MOOREFIELD

"YOU mean this fine bluestem meadow used to be cropland?" a farmer exclaimed. The occasion was a land use tour of the Lena-Long Watershed sponsored by the Greenwood County (Kans.) Soil Conservation District. The scene before the group of farmers attending the tour was a lush meadow of native bluestem grasses. The farm owner, James C. Shewmaker's explanation that over one-half of the 40-acre meadow had been artificially reseeded to bluestream grasses amazed the group. It was virtually impossible to distinguish the reseeded area from the virgin sod.

Behind the remarks of the astonished farmer lies a story of how one family by hard work, faith, and determination made a dream come true. It is an interesting story which began many years ago.

In 1926, Jim Shewmaker moved onto his newly purchased farm with his wife, Julia, and 5-year-old son, Dwight. The Shewmakers were young and ambitious. The 80-acre farm in the beautiful Bluestem Hills of Kansas, had a reputation of being a rundown farm. It was all sloping upland: 40 acres of eroded cropland and 40 acres of deteriorated native bluestem pasture.

The energetic and ambitious Shewmakers realized the impossibility of making a decent living on the farm. Also, the 80 acres comprised only the beginning of the farm of their

Note.—The author is work unit conservationist, Soil Conservation Service, El Dorado, Kans.

dreams. Jim had a job as a pumper in the nearby oil fields. He commuted daily to his job and worked the farm in the evenings and on weekends. Julia worked hard in the house and fields.

In the meantime, Jim was following the locally common farming practices on the upland—a rotation of sorghum and small grains. A couple of years of this convinced him that this was not sound agriculture. He and Julia talked it over and decided to build up a beef herd. But they knew they would need more pastureland to succeed. Jim reasoned that to have and maintain productive pastures, they should be thoroughly acquainted with the grasses adapted to the community.

The oil wells that Jim pumped generally were located in native bluestem grasslands. Thinking more and more of grasses, he became interested in the native grasses that grew so luxuriantly along the trails connecting his wells. During his spare moments, Jim studied these grasses closely. His interest aroused, he wrote to the State Board of Agriculture for a copy of a book on grasses in Kansas. He acquainted himself with the primary native grasses of the Kansas prairies and became convinced that in these grasses lay the answer to their problems. But he and Julia knew they would need more land.

Jim and Julia Shewmaker in one of their bluestem meadows.

Prospects looked dark when the Great Depression and the drought of the thirties struck. The arrivals of son Carl and daughter Genevieve made money more important. But family additions served only to stimulate their efforts through the adverse weather and economic conditions. Jim and Julia simply extended their timetable.

(Continued on p. 259)

Julia Shewmaker tending the cattle herd while husband and son were away during World War II.

Conservation Pr

By B. W

PERSIA is a land of variable climate, soil, vegetation, and topography that presents a maze of intriguing problems to test the ingenuity of the land management conservationist. Here a civilization has survived thousands of years of political strife that has heaped hardships on a rugged soil and a hardy people.

Persia lies between the Caspian Sea on the north, the Persian Gulf on the south, Iraq on the west, and Pakistan and Afghanistan on the east. Tehran, the Capitol City, lies at the foot of the Elburz Mountains at about the same latitude as Oklahoma City, Okla. The Plateau of Persia is boxed in by high mountains with small lowland areas near the southern end of the Caspian Sea and other lowlands near the Persian Gulf. This great plateau is an inland basin similar to the Great Basin of Utah and Nevada. Annual rainfall varies from 1 to 15 inches. Topography and elevation are similar to the Great Basin and southwestern United States. Climate resembles southern California, except in the southern Caspian area where rainfall distribution is more even throughout the year and reaches upward of 70 inches annually. There are no large rivers, and most Persian streams have no outlet to the sea.

Persian mountain systems are immature and rugged. Much of the exposed rock is limestone, presumably of Tertiary age. Rocks of igneous origin are common in places. Mt. Demavend, in the Elburz Mountains, northeast of Tehran, is an 18,600-foot high volcano. It is perched like a snow-covered inverted cone on top of the bulk of the Elburz Mountain mass. The Elburz chain extends from west to east across northern Persia and ranges in height from 6,000 to 18,600 feet. The Zagros Mountains shunt southeastward along western and southern Persia. Some of these peaks reach to 14,500 feet.

Note.—The author is soil conservationist, Soil Conservation Service, Washington, D. C. The material for this article was collected while he was on detail with International Cooperation Administration in 1955 as training leader of a range training course in Iran for students from Iraq, Iran, and Pakistan.

Both climate and geographical position have been ruling forces in the history of Persia. The Cain and Abel struggle between farmer and stockman began several thousand years ago when droughted-out nomadic herdsman invaded and subdued farmers in the irrigated areas. This seesaw struggle went on relentlessly for ages with drought and heavy grazing decimating the herds of the nomads, and nomad invaders plundering the villages until conditions on the ranges improved enough for herds and flocks to return again to the ranges.

Persia has the misfortune of lying across the natural pathway between the heavily populated areas of southern Asia and Europe. Conquerors from East and West have forever trailed both ways through Persia on military expeditions, hence she has been deviled by foreign interlopers for at least three thousand years.

Together the cumulative effect of internecine warfare between nomads and villagers and the raping and killing by foreign conquerors have exerted a tremendous strain on the natural resources of Persia and adjoining countries.

Diversion dam on the Kor River in sou

...blems in Persia

...ALLRED

To help improve conditions for our Nation's friends in the world, United States technical assistance has been extended to many countries. One of these efforts was a three-nation school in land management ecology sponsored by the United States International Cooperation Administration and Persia, Iraq, and Pakistan. The school was held in the spring of 1955 in Persia with headquarters in Tehran. The teaching staff was recruited from United States range scientists, Middle East International Cooperation Administration missions, and the Department of Agriculture of Persia. There were 29 students from the three nations, most being selected college graduates. Part of the training was done in classroom work at the University of Tehran, but much of the instruction was given during field trips to the Caspian area and to the Hamadan area in western Persia.

The people of Persia live deeply within tradition, and we unexpectedly witnessed a demonstration of it in deference to us the first day our college-on-wheels left Tehran for the Caspian area. The ceremony took place on a high pass in the Elburz Mountains at an ancient rock-walled caravansary at Godook, a stopping place for caravans, shepherds, and cavalry for ages.

...ern Persia, built about 1,100 years ago.

A delegation from the Caspian country welcomed us with a blood sacrifice. A young goat strung to a pole was the victim. We were welcomed in fluent Farsi by the leader of the Caspian expedition. Our host pointed to the headless young goat and bade us health and success on our trip through the marvelous Caspian country but wished our enemies the fate of the sacrificed goat. We had a marvelous trip.

Persians have always called their country Iran, the land of the Aryans, and changed their country's name from Persia to Iran in 1935. The first inhabitants of historical times, three thousand years ago, were members of the Indo-Iranian branch of the white race. Their speech was Aryan or Indo-European; their main religion was that of Zoroaster.

Then they were conquered by the Assyrians, to be followed by 18 years of domination by the Median Empire. Later Persia became a conquering nation under Cyrus the Great, 600-529 B. C. Cyrus spread his empire to include all lands between the Indus and Nile Rivers and as far north as the Black Sea.

His son, Darius the Great, succeeded him in 521. Both Darius and his son, Xerxes, failed to conquer the Greeks. A few generations later Alexander the Great of Macedonia retaliated by conquering the former empire of Cyrus, about 330 B. C. The Macedonians ruled most of Iran for nearly 200 years. Then the Parthians, from central Asia moved in as conquerors and rulers for nearly three centuries, until the Sassanian Persians took over around A. D. 226 and ruled until the conquering Arabs came in the seventh century and forced the inhabitants to adopt the Islamic religion and give up the ancient worship of Zoroaster.

During the 13th century Persia was brutalized and plundered by hordes of Mongols under chieftains like Ghenghis Khan. Then Tamerlane came, and later the Turks.

Irrigation through horsepower in Persia: (above) horse draws the water, (below) goatskin bag of water emptied into irrigation ditch.

Finally in 1923, after stormy centuries of foreign domination the country came into its own again under the leadership of a young cavalry officer, Reza Shah Pahlavi. His oldest son is presently the Shah of Iran.

The people of Iran have come through thousands of years' turmoil with a strong sense of national pride. Farsi, the national language, has survived but the transplanted religion of Mohammed is the basic religion with the Shiah sect strongly dominant. The people are excellent hosts and have a pleasant sense of humor. They are a deliberating race and not easily stampeded. They can take another day to solve a problem. They have a word for it, bookera—meaning tomorrow.

Eighty percent of the people are nomads and rural villagers; 20 percent live in cities. There are numerous tribes, the largest being the Kurds, Lurs, Bakhtiaris, and the Ghashgais, all of which live in the general area covered by the Zagros Mountains.

Persia has about 628,000 square miles of land. Most soils were originally developed as semiarid grasslands. Although not very high in organic matter, they produce good native grass crops with the winter rainfall that prevails. River-valley soils that were developed under abundant grass that formerly grew there are surprisingly fertile, even after hundreds of years of farming. Mountain soils are shallow and low in organic matter but produce excellent native grasses and legumes. Desert soils, abundant in the interior Persian plateau, are unstable and low in organic matter—large areas being covered with drifting sand dunes. There are large areas of sterile salty sinks resembling the Sevier Lake in Utah and Carson Sinks in Nevada. Soils under the lush hardwood forests of the southern Caspian area are largely of limestone origin and are slightly acid to neutral. They are extremely productive; some lands have been producing surprisingly good crops for centuries without the addition of fertilizer.

Erosion is paramount, being greatest on steep mountain slopes and on dry, sandy areas. Dust storms occur regularly throughout the summer in the central plateau where rainfall during that season is rare.

Buildings built by ancient Persian civilizations are buried beneath the sediments that have eroded from adjacent hills and flood plains. For example, the 20-foot foundations of the Persepolis, Darius' ceremonial palace, burned by Alexander during the third century B. C., was completely covered by soil eroded from the adjacent Mount of Mercy. This famous limestone mountain was productive grazing land in the time of Darius. Today it is an almost soilless limestone skeleton. Excavators are still digging out parts of the Persepolis from under its overburden of washed-in sediment.

About 12½ million acres are farmed, one-third being irrigated. About 6 or 7 million acres are in productive forests near the Caspian Sea. The remainder is range, desert, or inaccessible mountain crags.

Small as they are, the rivers of Persia are of inestimable importance to a country with so little water. The Elburz and Zagros Mountains are the main watersheds.

The river systems can be developed into productive and serviceable natural resources through conservation on the watersheds plus adequate storage developments, irrigation diversions, and conservation-irrigation works. At present most watersheds are severely eroded and stream valleys are gutted and strewn with rubble; floods are destructive and the water supply is undependable.

Too little has been done to develop springs and build stock ponds for livestock operations. However, there's one notable water development for which the Middle East and especially Persia is noted. This is the ganat—a battery of wells connected by underground canals which are brought out on grade to the surface to supply irrigation and domestic water for villages. Ganat makers dig wells into water-bearing sands or gravel and connect these wells with subterranean canals. Soil from the underground ditches is hoisted in baskets to the surface by ropes pulled by hand or windlass. The dirt is piled around the holes and the combination resembles doughnuts when observed from an airplane. Ganats are large enough for a canal digger to stand upright during construction and maintenance. Depth varies from a few to several hundred feet. The deepest ganat is around one thousand feet. There are about 50,000 of them; the largest extends about 30 miles, and it has been estimated that some have been yielding dependable flows of water for two thousand years.

There are strange contrasts in methods of water development for irrigation. Near the Persepolis are numerous shallow wells where sugar beets and other crops are irrigated with water raised in goatskin bags or buckets. The buckets are elevated by ropes drawn over crude pulleys by horses. Adjacent, on the Kor River, is a large and effective masonry diversion dam complete with distribution ditches built by Persian engineers about one thousand and one hundred years ago. This system has been in continual use with little requirement for repair or maintenance.

The four major natural plant communities varying from desert to humid forest are: desert, grasslands, savannah, and forest:

1. The desert community is made up largely of desert shrubs, annual grasses, and forbs; shrubs and forbs prevail. The desert community lives in the interior basin and annual rainfall varies from 1 to 5 inches. True desert occupies 10 to 15 percent of the country. Little study has been made of the vegetation. Some of the plants are related to mustards, Russian thistle, wild lettuce, wheatgrasses, and needlegrasses.

Nomad family milking fat-tail sheep near the Zargos Mountains.

Firewood on its way to market in Shiraz, Iran.

2. Grassland is the most extensive plant community. Cool season plants predominate because of winter rainfall conditions and dry summers. Perennial plants still are most common despite the fact that most of the ranges are in poor condition. The range in species of plants varies greatly within moisture belts, but the same plant genuses are paramount in most of the rainfall zones which produce grass. For example, most of grassland moisture belts have species of wheatgrass, brome, fescue, bluegrass, needlegrass, and orchardgrass. The same situation is true of forbs, particularly legumes of both annual and perennial types. The legumes include species of alfalfa, clover, sweetclover, burclovers, medics, and so on. In fact, most of the cool season plants that were imported years ago for use in the United States are found growing native at various elevations and temperature belts in Persia and Iraq.

Annual plants including bromegrasses, wild barleys, and others, make up a considerable amount of the cover on rundown ranges but were seldom seen on the few ranges that are in good and excellent condition. Bermudagrass, a warm season plant, is the most widely distributed grass of all. It grows from sea level to 7,000 feet elevation on some mountains.

The actual needs for replanting are restricted primarily to ranges near villages, where constant close cropping for generations has killed off the desirable perennial range plants. These acreages are small in comparison to the vast ranges that can be brought to a high state of perfection by sound grazing practices alone.

Already it has been found from planting trials that these denuded lands can be seeded and made to produce again. The wheatgrasses, such as crested and intermediate, have been seeded with stock imported from the United States. These same plants are native in Iran and plans are being made to protect and harvest native stands for local seed sources.

First estimates were that most Persian ranges would need replanting because they looked so depleted. But after enough sample range areas were fenced against animals and rested, it was learned that enough good grasses, forbs, and shrubs remain alive on most ranges to restore them naturally, provided light stocking and growing season rests are used.

3. Savannahs are small in area and are restricted to high elevations in the Zagros Mountains and along the transition zones between forest and grassland in the Elburz Mountains. Rainfall conditions in savannahs are excellent for grass, fescue, and wheatgrasses are native to this habita. Savannah sites represent, minimum habitats for trees. Several species of oak, cypress, and juniper are the major wood plants of the savannahs. These are used for charcoal, wood, and building material.

4. The hardwood forests of the Caspian section are of great importance to Persia. In fact this is the only area of commercial timber in the countries of Persia, Iraq, Jordan, and Arabia. Some of the land nearest the Caspian Sea has been cleared and is farmed and pastured. Many forests near the towns and cities have been mutilated for ages, and only shrubby growth remains, and this is harvested continually for fuel and small building materials. Until recently, forest products were transported on the backs of mules and donkeys, hence large parts of inaccessible forests have remained in their virgin state. Rainfall is from 30 to 70 inches and tree production is high. Species of oak and beech are important commercial types but dozens of other kinds are available.

Visitors at a nomad camp near the Elburz Mountains.

5. There are small areas of tundra in some mountain tops but area-wise they are of little significance. Little is known of this vegetation, although species of legumes, bluegrasses, and fescues have been observed.

The visitor to Persia cannot help but be astonished at the durability of both soil and vegetation in a land where farming and grazing pressures have been so acute for thousands of years. However, the resurrecting powers of both land and grass are immense when proper care is given.

Persians depend greatly on their crops for sustenance and a wide variety is produced. The main crops are wheat, barley, rice, tobacco, opium, cotton, sugar beets, sugar beet seed, tea, and hay.

The following fruits are important: grapes, dates, olives, citrus, apples, cherries, peaches, apricots, and pears. Nuts are grown and large amounts are exported. These are pistachios, almonds, and hazelnuts.

Greater crop production is sorely needed to feed the people, but there are numerous opportunities available to accomplish this through better soil conservation, seed improvement, and greater irrigation development. Except in the Caspian area most of the plowing is done with ironshod wooden plows, pulled by small underfed oxen. Transportation of products on the farm is largely on the backs of the laborers and donkeys. Large acreages of roughage need to be produced on the croplands to provide feed for both village and nomad livestock.

Persia is largely a range country and most of the livestock are raised by nomads who summer in the mountains and winter in the lowlands.

Livestock numbers are estimated to be as follows:

Sheep	21,650,000
Goats	9,730,000
Cattle	3,150,000
Donkeys	3,000,000
Horses	450,000
Water buffalo	194,000
Camels	100,000
Mules	93,000
Pigs	32,000
Poultry	25,000,000

Nomad stockmen are friendly and hospitable. They move their herds and flocks up the mountains in spring as the grass and other forage greens up. They graze back to winter in the warmer lowland ranges. Everything they own is transported on the backs of donkeys and mules, with cattle sometimes being used for pack animals. Cows, ewes, and nannies are milked and milk is used directly as food or converted to yogurt or cheese for future use. Sheep are the most common nomad animal. Fat-tail sheep are the most numerous.

The gray-black tents lived in by nomads are made from goat hair woven by the women. Nomads generally are happier and better fed than farm-village laborers.

Excavated ruins of the Persepolis with Mount of Mercy in background.

Adapted livestock breeds from America are being used in grading up the size and producing power of native animals—artificial insemination is being used widely by local Persians trained for the work.

Better livestock development has made it necessary to start a program for increasing the quantity and quality of forage resources to care for these bigger and better animals that require more feed and care than the native animals that have been conditioned to harsh conditions for centuries.

When put into the perspective of the past, Persia has emerged as an independent nation after thousands of years of barbarous conquest by foreigners. The pressures from the past have sapped her natural resources, but have not killed the compelling urge of her people to recreate the nation into the type of splendid prosperous country that existed when Darius reigned.

The nation, particularly the Iranian Department of Agriculture, is busy trying to reconstitute a strong agriculture which is essential to their national welfare. They are drawing considerably on the friendly technical help from the United States to help bring this about. The hopeful sign is that a crop of eager young Persian technicians are being developed to take over the responsibility of building Persia's agriculture.

This District Stands Apart

By KENNETH W. SHANKS

THE Lake County (Colo.) Soil Conservation District deserves to be called unique. First, only one-twelfth of its total area is in private ownership and, second, all of its irrigated land is about 2 miles above sea level.

This district lies in a high mountain valley surrounding the historic mining town of Leadville. The lowest elevation is 10,000 feet and the highest points are Mount Elbert and Mount Massive, which reach to 14,431 and 14,418 feet, respectively—the highest peaks in the Rockies.

The 25 landowners in the district include the Forest Service, the Bureau of Land Management, the State of Colorado, and one irrigation company. There are only 13 operating ranches. The district's total area is 239,000 acres, of which only about 20,000 acres are in private ownership.

At first glance this looks like an ideal situation for getting all the needed conservation work, both vegetative and structural practices, established in short order.

For example, there are only 1,500 acres needing drainage and 3,500 acres needing leveling for application of irrigation water; 32 large irrigation structures are to be built, and 6,000 acres of mountain meadow hay land to be renovated and reseeded for production of high quality forage. These are but 4 of the 22 required practices.

A little closer look, however, reveals some serious problems. They are of a kind calling for considerable research. Practically all the soils are light—sand and silt, with gravel, cobblestones, and rocks right up to the surface; hard to plow. These soils won't hold much water. If irrigation water is kept off the meadows for very long, the meadows dry up. This means that subsurface water-table control is necessary. There are, too, deep and extensive peat bogs in the meadows. If the existing poor plant cover (mostly rushes and sedges) over these bogs is killed by plowing, how is a new stand of grass to be established? There are other problems also, such as an average growing season of only 80 days, and 12 feet of snow each winter. The average last frost is June 17 and the first around September 7. The only time that ranchers have a slack period is when snow is on the ground.

But the district is making good, if slow, progress. Pete Cavalli, for example, has increased his hay yield of timothy and alsike from 0.2 ton per acre to 1.17 tons by good management practices alone. George Loomis, another cooperator, has repossessed 80 acres of grazing land by drainage. What these ranchers are doing is typical here.

Note.—The author is area conservationist, Soil Conservation Service, Pueblo, Colo.

CONSERVATION ON BLUESTEM HILLS

(Continued from p. 251)

During the summer of 1938, weather conditions were ideal for the production of bluestem grass seed. The well managed native pastures and meadows became seas of waving seed heads. The Shewmaker's got busy. When winter arrived, they had harvested tons of seed on the home place and on neighbors' land. They sold and shipped seed throughout the range area. However, they kept enough for their own use.

In the spring of 1939, Jim and Julia started their grass program by seeding 25 acres to bluestem grasses. The field selected had been in row crops for several years. A clean seedbed was prepared and the bluestem seed broadcast by hand. This was a pioneer project in the Bluestem Hills. Residents did not believe it possible to seed bluestem. Only Mother Nature could do that. But Jim and Julia believed if you helped Mother Nature she would help you. They were right. The rains came at the right time and a good stand of grass resulted.

In 1940, an adjoining quarter section of land was purchased. This tract contained 90 acres of eroded cropland, the remainder being depleted native grassland. The former owner for years had rented it to a local horse trader, who had used the pastures to hold large numbers of horses and mules between trades. Only remnants of the climax grasses remained when the Shewmakers acquired the farm. Invading weeds and grasses were abundant.

The Shewmakers had been casting wishful eyes toward this one-hundred-sixty for years. Their plan of action was ready. The main objective was to plant 50 acres of the eroded cropland to permanent pasture, 20 acres to bluestem, and 30 acres to cool season tame grasses for winter pasture. The stocking rate on the 70 acres of abused native pasture was adjusted to the growth habits of the remaining climax grasses to return them to normal production.

Slowly the productivity of the farm was increased. The original pastures were producing luxuriant forage. Bromegrass and alfalfa were growing in the crop rotation for winter pasture and hay. The newly seeded bluestem grasses were producing prairie hay for winter feed. A small beef herd had been built up. Farm income had become substantial. Jim decided to resign from his oilfield job and devote full time to the farming operations.

With the entrance of the United States into World War II, the Shewmakers had a serious family council. Jim felt that he should do more than remain home on the farm and Dwight was ready to enlist for military service. Within a short period, Jim was at Pearl Harbor laboring on the naval base and Dwight was in uniform. Julia assumed responsibility for the farm oper-

The Shewmakers in a wheatfield, with their home in the background.

ations. Fourteen-year-old Carl and eight-year-old Genevieve were her assistants.

The war finally ended and Jim and Dwight returned to the farm, but then Carl was in military service. Dwight bought the 200-acre farm across the road and moved there with his young wife. Jim and Julia resumed their prewar methods. Another eroded field was planted to bluestem and 40 acres were planted to brome and Kentucky-31 fescue for cool season pasture. After much discussion, most of the cows were sold and a steer program started. They reasoned that steers would better fit their operations.

In 1950, the Greenwood County Soil Conservation District was organized. Jim and Dwight became early cooperators. But changes and interruptions were still ahead. The Korean War struck and Dwight was recalled to military service.

Genevieve's marriage left Jim and Julia alone on the 440-acre farm.

Still enthusiastic and ambitious, the Shewmaker's pushed on with their plans. Working with SCS technicians, the finishing touches on their conservation program were completed. Terraces, contour farming, stubble mulching, and a grass-legume and small-grain rotation protects all cropland from wind and water erosion. A pasture program to properly use both tame and native pastures is being adhered to faithfully. Stockwater ponds to provide dependable water and assure uniform grazing have been constructed. The last one, completed in 1955, is a beautiful pond with a water depth of 17 feet. The entire pond of more than two acres is encircled by a strong fence and provides recreation and fresh stockwater. The pond will be stocked with bass, bluegill, and channel cat. Also, water from this small lake will be pumped to corrals and buildings.

The Shewmakers have indeed done a commendable job. From 1926 to 1956 may seem like a long time. But to Jim and Julia Shewmaker it has been a short period of hard work, disappointments, happiness, and successes. Starting with a depleted 80 acres, the Shewmaker farm now contains 440 productive acres. Once poor pastures are now in good to excellent condition. Once eroded cropland is now producing luxuriant pasturage. A conservation program has returned all other cropland to high productivity. The livestock carrying capacity of the farm is now double that of the three units at the time acquired. Proper land use has made it possible.

Level Water on Sloping Land

By F. A. MARK and CECIL McCORMAC

WATER runs down hill, but the best way to irrigate is on the level. It's not a new idea, though it's new in the Northwest. Farmers in the Southwest have been using level irrigation for years because it is the most efficient way to use their sparse water supply.

What is level irrigation? It is done by preparing a field with closed borders leveled to a flat plane. If there is cross slope on the land, the closed level borders are benched on widths varying with the land slope, available water, and soil type.

There are many advantages to level irrigation. It has been used on lands up to 5 percent or more slope in the Southwest. But in the Northwest in the Columbia Basin where SCS technicians have recently laid out more than 3,000 acres of level irrigation for soil conservation district cooperators, it is being limited mainly to lands with slopes of 2 percent or less.

Level irrigation is an important water conservation measure. Even where water is plentiful, such as the Columbia Basin, after you have used 3½ acre-feet, you pay a premium for additional water. Using less water by level irrigation—there is little waste water—prevents raising of water tables and subsequent salinity problems. It saves irrigation man-hours. It eliminates soil erosion. It insures even distribution of water over the entire field, resulting in maximum yields, uniform quality, and uniform maturity of crops. It allows close control

Note.—The authors are, respectively, deputy state conservationist, Soil Conservation Service, Spokane, Wash., and area conservationist, Soil Conservation Service, Ephrata, Wash.

Level irrigated beanfield in Quincy Soil Conservation District.

of needed water application, depending on soil depth and stage of crop growth, which may vary from an application of 2½ acre-inches to an acre-foot. Level systems have been installed which operate automatically with electric controls.

The requirements to effectively operate a successful level system are not difficult, but are based on sound, simple engineering and soils data.

As a first requirement, the closed system must be level or nearly level. Ditches must be capable of handling a large volume of water—say from 5 c.f.s., to 15 c.f.s. There must be a large stream immediately available. There must be good structural control. The ideal farm system, especially in light soils, consists of carefully designed and constructed concrete-lined ditches and concrete watercontrol strucutres. However, some farmers are effectively using 6-inch aluminum siphon tubes with earth ditches. If there is an appreciable amount of silt, or silt and clay in the soil, a stable ditch can be built if properly packed during construction.

Let us assume the water supply is 2½ c.f.s., and the soil requires a 5 c.f.s., stream to irrigate a flat field 660 feet long and 65 to 70 feet wide—Columbia Basin farmers are solving such stream problems by building overnight storage reservoirs which provide a good daytime stream and a well-earned night's rest. If you have 80 acres and 2½ c.f.s., continuous supply, by using a night storage reservoir and taking the flow into the reservoir for 12 hours, you can have a 5 c.f.s., stream for 12 hours; or if you store for 16 hours, you can have 7½ c.f.s., for 8 hours. Why break your back over a shovel for 24 hours a day when you can take the job easy 8 hours a day, and do a better job? With a 5 c.f.s., stream you can apply 6-inches of water to 10 acres in a 12-hour day. This will provide irrigation on all the land every 8 days. Shallow rooted or new mown crops will require considerably less than a 6-inch application.

Level irrigation is particularly adaptable on farms having light soils because almost in-

Irrigation on leveled land with closed borders. Note the uniform depth and advance of water.

variably, by regular methods, the upper end of the field is waterlogged and the lower end burning up. The longer the run attempted the more chronic is the trouble at both ends of the field. Actually, with level irrigation the length of run may be longer because larger, non-erosive streams of water can be used and the water will reach the lower end of the field much quicker. While water may be ponded several inches deep, depending on the soil and crop needs, it will soak into the soil in 1 to 2 hours. With other types of irrigation the field or parts of it, may be saturated with all aeration stopped for as much as 24 hours, with subsequent crop loss. In addition to crop loss, farm and community drainage become impaired and salinity accumulation intensified.

Closed borders completed for level irrigation, Quincy Soil Conservation District.

The usual set of negative arguments may be found among many farmers about starting a new practice. To stop negative arguments about level irrigation demands only one solution—go to the farmer using the system, look at his uniform maturing, healthy crops and ask him what he'd take to change back. He will convince you his decision for level irrigation was sound, and he will be congenial in doing it—because he had a good night's sleep.

WHY AGRICULTURAL RESEARCH IN A TIME OF ABUNDANCE?

By SHERMAN E. JOHNSON

THE people who ask the question assigned to me, "Why agricultural research in time of abundance–" probably should broaden it. Production research is not the only force pushing toward increased output. New reclamation projects, some aspects of the Agricultural Conservation program, the Soil Conservation program, and Extension activities also have production-increasing results and increase production in that way. Some involve additional public and private investments that increase output. But whatever means are used, we must recognize that the chain reaction would be less rapid if these activities also were either slowed down or dispensed with in a time of abundance. Perhaps, therefore, the question is: *Why research, extension, conservation, and reclamation activities in time of abundance?*

I am, by no means, recommending either curtailment or suspension of these activities. Neither am I recommending slowing down or dispensing with production research. In fact, we need much more research to guide adjustments toward a more profitable agriculture. But we should be open to suggestions for changes—in research as well as in other activities.

Let us see if we can sharpen our focus on the question by standing back and taking a new look. To get away from our set focus, let us think of an exaggerated version of the problem. Assume that researchers are about to make a radical discovery that has the potentiality of increasing crop production per acre about two or threefold within a short period of time. Suppose that by adoption of this discovery we would need only half as many people in agriculture as we now have, and that we could meet our needs for food and fiber on only half as much land as we are now using. This assumption may sound fantastic, but to the layman the possibility of harnessing atomic energy would have sounded fantastic 15 years ago. There are rumors now that we are on the threshold of discovering the secret of photosynthesis. I have some difficulty visualizing the potential effects of such a discovery, and I am mentioning it only because the assumption of remarkable increases in production efficiency may not be entirely fantastic.

If a discovery were made that doubled the output from labor, land, and other resources, should we adopt it and make the needed adjustments in agriculture?

Note: The author is director, farm and land management research, Agricultural Research Service, Washington D. C. This article is based on a talk given to the Washington Chapter of the Soil Conservation Society of America on March 13. 1956.

Or should we let such a discovery lie dormant and continue to produce farm products with the old techniques? The latter choice would be comparable to the attempt of the Lancashire hand loom weavers to destroy the power looms that were capturing the markets for the product of their labor in the early years of the industrial revolution in England. The Lancashire weavers were not successful in halting the march of technology. But the transition to the new methods, and the new way of life caused untold misery to more than one generation of British workers, because adequate steps were not taken to cushion the shock of transition.

In my opinion, agriculture in this country must keep step with progress in the rest of the economy in order to attract and retain persons of ability in farm occupations. Our agriculture also must keep step with technological progress in other countries in order to hold our place in world markets Therefore, the only logical choice seems to be to continue research and discovery in the production field, and to utilize the results whenever they become available. But we can direct our applied research toward amelioration rather than accentuation of farm surplus problems. This choice also involves a responsibility of companion research: (1) To appraise the potential impacts of new developments, and (2) to help those disadvantaged by the change to adjust to the new technology or to shift into other employment. The greater the impact of the new development, the greater the need for research to appraise the impact and to work out ameliorating adjustments.

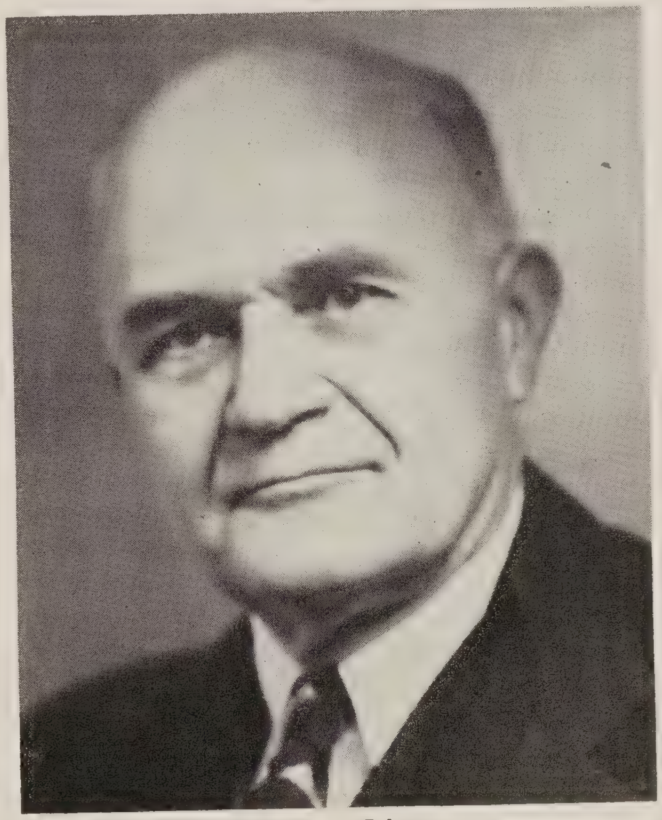
Companion research of this type has been grossly neglected in both publicly and privately supported research programs in this country. We have unconsciously assumed there is sufficient flexibility in the use of farm resources to permit farmers to adjust to the new developments, either by adopting them to their advantage, or by shifting to other employment if they found the going too hard.

Unfortunately, it is not easy for farmers, once committed to farming, to shift into other employment. Neither is it easy to learn new farming skills, nor to abandon heavy investments in prevailing methods of production, especially when the improved methods involve new investments for which neither funds nor credit are available. These and other obstacles to profitable adjustment must be recognized and dealt with in agricultural research and in farm programs.

Over the years technical advancement in agriculture has contributed immensely to public welfare. It has made possible production of food and fiber with much less labor and other resources. Released labor has been available for development of other industries and services in our economy. Further technical advances in agriculture also would be in the interest of public welfare, especially under prosperity conditions, when other employment is available.

But, in view of the fact that the benefits of technical advances in agriculture are so readily shifted to other groups in society, the national interest requires a thorough-going research program directed toward helping those who are disadvantaged by technical or other changes in agriculture that are beyond their control as individuals. Research should not only provide guidance in adjustment to those who continue to find their best economic opportunities in farming, but also to assist those who will benefit by shifting to other employment. But large-scale adjustments of this type don't just happen. They need research guidance and program assistance as well.

Even if production research occasionally causes new problems, we have to recognize that it cannot be turned on and off as needed, the way we regulate the water in a faucet. It is much better to have knowledge gained from research when we need it than to need it and not have it.



Sherman E. Johnson.

Our backlog of unutilized research was a life saver in World War II. We need a reserve of knowledge and a corps of competent scientists who can tackle problems that may emerge without warning. Suspension of production research is unthinkable, but we can and should raise many questions about redirection.

A basic research program to develop fundamental knowledge concerning agriculture needs to go forward at all times and in all fields. But research applied to specific problems can and should be geared to provide maximum assistance on problems that farmers are likely to face in the years ahead.

In looking ahead we need to differentiate between prospects for the next several years and the longer term outlook. We need to recognize that as a result of wartime expansion we have productive capacity more than ample for today's markets. In fact, output in 1955

was nearly large enough in volume to meet the projected needs of 1960. But we produced much too much of some products and too little of others to balance with potential needs in 1960.

We also need to ponder the narrowness of the margin between abundance and scarcity. What happened after the Korean outbreak could occur again. A new international emergency, or even a serious drought, could change the surplus struggle to a concern over deficits. Even our present large carryover of concentrate feeds represents only about 4 months' supply.

Because of the narrow margin between abundance and scarcity, and because of uncertainties with respect to drought and international developments, we should maintain *reserve capacity* that will permit us to increase output quickly if the need should arise.

Providing such a reserve calls for much more research on resource protection than is now being carried out. But we need to distinguish, on the one hand, research that will increase output in the immediate future. In assigning priorities for research, the former should receive the major emphasis.

Research to achieve adequate protection of our land and water resources is extremely important, both as insurance against emergency needs and to provide for possible food and fiber needs of future generations. To do it effectively requires teamwork because we are looking for practices that not only conserve soil and water but also fit into a farming system that is profitable to farmers. This may involve soil and water, crops, livestock, engineering, economics, and perhaps other specialties as well.

Under the conditions we are facing at the present time, protection of our land and water resources involves building up reserve capacity to meet unforeseen *future* needs. This will help provide protection for all of us as citizens. But we are not likely to develop ways that will enable farmers to bear the entire premium cost of such insurance for the entire population. This seems to involve programs such as the proposed conservation reserve, backed up by research to make such programs most effective.

Considering population increases and general growth in the economy, we should be able to achieve a better balance between production and markets than we now have. Recent projections indicate that we may need about a 30 percent increase in output during the next 20 years in order to meet market demands at the end of that period. Barring unforeseen emergencies, very little of this increase will be needed in the next few years. And even in the latter part of the 20-year period, I see no reason for worry about "food enough" under peacetime conditions. The more important questions will be how to gear production expansion to market prospects, and how to produce the needed products efficiently, with returns to farmers comparable to other groups.

Shifts in production will be needed to meet market demands in the years ahead. The most rapid growing points in the market are in the livestock and fruits and vegetables sectors. On the other hand, the outlook is distinctly bearish for wheat for food uses. And unless new markets are developed, cotton also is likely to continue to encounter adjustment problems.

The question is then: What can researchers do to facilitate the needed shifts in production? What are the alternative uses of the wheat and cotton lands that need to be shifted? How can these adjustments be made in ways that will be profitable to farmers? The problems are big enough to challenge the best brains of researchers and of other people as well.

The problem of shifting is in part encompassed in the problem of building *reserve capacity.* These two problems together, seem to me, to offer the greatest challenge to researchers in applied fields who are looking for ways to make significant contributions to agricultural welfare.

COOPERATORS TO THE RESCUE.—John Lyman, Middlefield, Conn., dairyman-orchardist, lost 50 registered Guernseys in a fire, but found the true meaning of the word, "cooperator." Twenty fellow-members of the Middlesex County Soil Conservation District rushed to help put out the blaze. Then, they stayed two more days cleaning up the ruins with their own trucks, tractors, and loaders. Lyman learned one other soil conservation advantage: His farm pond-water saved several nearby buildings from the flames.

ARTHUR H. MECKLEY

WOODLAND FARMING A SUCCESS.—Mac Garland of Emmet, Ark., planted 4 acres to pine seedlings in 1940. In 1950 he made his first thinning and netted $20 per acre from the plantation.

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OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

OUR SOIL ★ OUR STRENGTH

★ THIS MONTH ★

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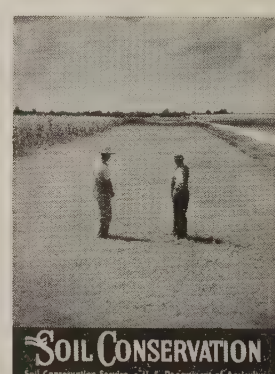
PHOSPHORUS FROM THE SUBSOIL.—Experiments with radioactive phosphorus show that corn can get more phosphorus from the subsoil than previously believed, according to tests conducted by John Murdock and L. E. Englebert, University of Wisconsin soil specialists.

They report that corn can get from ½ to ⅘ of the phosphorus it needs from below the plow layer if phosphorus is present in available form. The soil type and weather conditions make a difference, though. Miami subsoils furnished 53 percent of the phosphorus, Dodge subsoil gave 55 percent, Parr subsoil gave 77 percent, and Kewaunee subsoil gave 80 percent of the phosphorus that the corn plants used.

The soils specialists determined phosphorus uptake by placing a radioactive form of the element at 6-inch depth intervals in the soil down to 3 feet below the surface. The fertilizer phosphorus taken up by the plant then was determined by a Geiger counter. It was found that the 6- to 12-inch layer of the soil contributed the most phosphorus of all the subsoil layers. In general, plants fed less on the phosphorus from the lower subsoil depths.



FRONT COVER.—Waterway, sodded to bermudagrass in Grayson County, Tex., that stabilizes terrace outlets for 40 acres of cropland.

Government Printing Office, Washington 25, D. C. All orders go to the Superintendent of Documents,

Productive Nursery from Wornout Land

By CARL O. CLARK

IN 10 short years Peter and Edmond Mezitt of the Weston Nurseries have literally rebuilt more than 200 acres of wornout farmland into good cropland in Hopkinton, Mass. Since 1948 they have cleared the stone to a depth of 3 feet on a stony drumlin. They have leveled 40 acres of glacial outwash soils, planted crops on the contour, constructed 3 miles of diversion terraces, established grass waterways, constructed outlets, installed more than a mile of drainage tile, and planted cover crops between the rows of nursery stock. This team of father and son are in the business of soil conservation and land improvement in a big way.

Weston Nurseries in Hopkinton came about because Weston Nurseries in Weston, Mass., lost a big chunk of land when the Metropolitan District Commission put an aqueduct across their property, and then a new road took another chunk. Land in Weston became too expensive to use for farming, so the Mezitts started looking for new land. They found it in Hopkinton in several old farms with acreage enough to meet their needs. The big trouble with this land was its wornout, stony condition.

In 1946 the Mezitts bought two war surplus bulldozers and went to work clearing and reclaiming the land. A piece of land would be cleared and planted immediately to nursery stock. By the time the Middlesex Soil Conservation District was organized in 1947, Weston Nurseries was already in trouble with serious erosion on these hillside fields. Many gullies had been formed by rushing water.

Then Peter and Edmond Mezitt heard of Middlesex Soil Conservation District and the possibility of getting technical assistance. A farm conservation plan was completed for their nursery farm in March 1948. The first practices planned and applied were diversion terraces and contour planting. When Edmond and his father saw the results of these conservation practices, they made every effort to get the complete job done as speedily as possible. Eddie bought himself a transit and laid out all his new plantings on the contour, as suggested by the Soil Conservation Service technician in Middlesex District. They dug up old plantings so that key diversion terraces could be constructed, and they planted cover crops of oats and barley between the rows of nursery stock during August and September. By the fall of 1950 erosion was no longer a serious problem.

Peter and Edmond tell of hillside "lakes" which they have created by their contour planting. After a heavy rain, water is held on the hillsides for several hours before it soaks into the ground or finds its way into a safe water disposal system. The Mezitts say that visitors have marveled at what appeared to be a lake on their steep hillsides. All because of the water

Edmond and Peter Mezitt handle one of their prize azaleas.

Note.—The author is work unit conservationist, Soil Conservation Service, Concord, Mass.

Nursery stock planted on the contour on the Weston Nurseries.

retained by contour rows of nursery stock. Eddie says, "We need this water to grow our crop. We have found that this Paxton soil in Hopkinton, contour planted, will grow a crop of nursery stock in about one-half the time required on our Weston farm. Water conservation is just as important to us as soil conservation. In fact, I do not believe that you can successfully divorce one from the other."

The Mezitt's Weston farm is still in operation, but they are gradually moving all their operations to Hopkinton. In 1950 they bought another farm in Hopkinton consisting mostly of glacial outwash. This farm was pockmarked with holes and knolls which made farming rather difficult. Crops on the knolls would not grow because of drought, and crops in the holes had wet feet. By this time Weston Nurseries owned several bulldozers, so they started leveling this whole farm. They do this by stripping the topsoil off a large area, leveling the subsoil, and respreading the topsoil. Eddie says, "Even though we had no topsoil on the knolls, it ran as deep as 6 feet in the holes. When we get a piece completely leveled, we find that we have from 18 inches to 2 feet of topsoil over the whole area."

The problem of maintaining organic matter in nursery soils became more and more apparent to Peter and Eddie, so in 1951 they bought a wood chipper that they use in their clearing operations. When they cut off an area now to clear for cropland, they chip all the brush and treetops. They find it faster than burning and they have a lot of valuable organic matter that they can use in their nursery.

Paxton soils, which predominate on the uplands of the nursery, are underlaid by hardpan and are usually full of seep spots. Diversion terraces may take care of these seep spots and areas, but it was found necessary to supplement diversions with tile drains in some spots. In 1955 more than a mile of tile drains were installed, and plans have already been made to put in at least another mile in 1956. These tile lines are laid at an average depth of 4½ feet and spaced about 50 feet apart. A gravel bed is made for the tile and the tile is covered to the top of the hardpan with more gravel. This allows surface water to make its way down into the tile. The 1950 installation turned a poorly drained field into a field that is well drained.

The ownership and management of Weston Nurseries combine outstanding professional training, experience, and business acumen. Peter Mezitt and his wife were born in Latvia and attended a horticultural school in Czarist

Russia. During a number of years after his coming to America, Mezitt gained valuable experience while working as gardener and foreman on estates near Boston. But all the while, he had his mind set on starting a nursery of his own, which he did in Weston a little while before the depression of the thirties.

Edmond, the son, grew up in the nursery business and topped practical experience with professional training in landscape architecture, in which he was graduated at Cornell University in 1938. Father and son have developed one of the largest and finest nurseries in the Northeast, that does an annual gross business valued at $350,000 to $500,000.

Diversion ditch on Weston Nursery.

Ridge Farming for Erosion Control

No. 15

This is the fifteenth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By W. F. BUCHELE, E. V. COLLINS, and W. G. LOVELY

AGRICULTURAL scientists are continuously seeking tillage systems which embody the best soil and water conservation principles without sacrificing yields. To be acceptable a system, in addition to providing year-round protection for the soil, must assure adequate yields and provide for efficient use of labor and machinery. In their attempt to find such a system United States Department of Agriculture and Iowa Experiment Station agricultural engineers and agronomists have been studying tillage systems.

Note.—The authors are agricultural engineers, Agricultural Research Service of the U. S. Department of Agriculture and the Iowa State Agricultural Experiment Station, Ames, Iowa.

Such questions as follows are still asked of each system: Does the system control water runoff? Does the tillage system prevent soil erosion? Does the system provide for above ground water storage? Does it prevent soil blowing? Can it work on slopes and flat ground?

One of the most promising tillage systems developed has been called ridge farming. This system is somewhat similar to contour listing except the crop is planted on the ridge instead of in the furrow. By planting on top of the ridge the best features of listing, bedding, and conventional farming are combined.

A review of corn production literature shows that Jones and Beasley at the Missouri Experiment Station experimented with ridge farming for 3 years starting in 1938. Yields were low but this was offset in part by lower requirements in power and labor. The experiments were abandoned due to lack of machinery to construct ridges and to cultivate and control weeds on the ridge.

Contour listing has been used for a number of years in western Iowa and eastern Nebraska. Experiments in western Iowa show that contour listing reduces soil loss to ⅓ and water runoff to ½ that of surface planting.

Ridge farming as now practiced consists of planting on contour ridges, preemergence spraying to control early weed and grass growth, and mechanical cultivating to control late weed and grass growth. The ridges are maintained throughout the year and all cultivations are conducted to maintain or increase the size of the ridge.

Many new herbicides have been developed that show promise for controlling weeds in row crops. Several years of experiments in Iowa, using 2,4-D as a preemergence spray application, have indicated that it gives excellent control of early annual grasses and broad-leaved weeds. This spray applied at planting time retards the growth of annual grasses and prevents the growth of susceptible broad-leaved weeds for a period of 4 to 6 weeks.

Experimentally a 5 year rotation of corn, corn, oats, meadow, meadow, has been followed on ridges. This is feasible if the small grain and meadow crop can be direct harvested. Two years of corn grown on ridges with small grain and meadow crop flat planted is practical because the ridges can be leveled with one pass of disk cultivator by setting the disks to throw out, or with two passes of a tandem disk used in the conventional manner.

The laying out of the ridges is of special importance as they will be maintained throughout the year and possibly for two or more years. If the field has already been terraced then it is relatively simple to lay out the ridges. They are formed starting at the top terrace ridge and working down the slope parallel to it. At the end of the row the ridges are turned down the hill and the return pass is made parallel to the first ridges. When the lower terrace channel is reached the ridges are ended in the terrace channel. The terrace channel is seeded to grass in areas where it is used for turning. A seeded or surface planted area is required at the row ends for turning purposes. Existing waterways are used in this layout.

A field of mature, ridge farmed corn.

If a field has not been terraced a contour or graded line is located at or near the top of the slope. If the line is on the contour it should be located as close to the top of the hill as possible. A 3 to 5 foot vertical interval is permissible from the top if a .4 to .5 percent graded line is used and if reverse grades do not occur in the furrows constructed above and parallel to this line. If reverse grades are found in furrows, less vertical distance between contour control lines is used. Use is made of all natural waterways and new waterways are established to have a turn strip at row ends to avoid turning machinery across the ridges. This turn strip may be a waterway, a grassed area, or a surface planted area.

A rope is used to walk in a parallel line with a 5 to 7 foot vertical interval down the slope from the top graded or contour line. If the grade of this line is too great, (4 inches of fall in a row 100 feet long is considered maximum) a shorter vertical interval is used by moving up the slope.

After the new contour or graded line is laid out, a 30-foot grass correction strip is established below it. Ridges are constructed below and parallel to the lower side of the grassed strip. This process is repeated until the bottom of the slope is reached. All row ends are turned down the slope to avoid catching runoff water. All short rows are ended on the lower correction strip.

The ridge farming system has been used on three farms on a field basis. Sufficient waterways and correction strips were used to prevent excessive grade in the furrows, break up row length, and give good control of the water. The correction strips provided a convenient place for turning when short rows were encountered. The number of correction strips used on long slopes varied from 2 to 4, depending on the terrain.

Ridges may be constructed with a disk culti-

Water standing in contour ridge farmed field after 1½-inch rain.

vator or a plow. If a disk cultivator is used the field is first plowed and the ridge formed with two 16-inch disks operating on each side of the bed. After the first pass has been made over the entire field the center two 16-inch disks are removed and replaced with 12-inch disks. Another pass is then made over the field to increase the height of the ridges. Sweeps may be used in the furrows on both the first and the second pass to plow out the soil left by the two center disks and to loosen the soil in the furrows so that the soil may be easily moved during succeeding operations.

If the ridges are constructed with a plow, the bottoms are arranged so that 1 furrow slice is inverted onto an undisturbed strip approximately 2 furrow slices wide. With the proper tractor wheel spacing, uniform ridges can be constructed on 40 or 42 inch centers. The furrow walls are used as a guide for the tractor wheels. Wide front end tractors are easiest to use for this operation. Nearly all plows can be modified to make ridges. With this method of constructing ridges approximately one-third of the land is plowed. However, it is usually necessary to make one pass with a disk cultivator to break up large clods, shape the ridges, and control weeds prior to planting.

If the ridges are formed in the fall, they may need another disk cultivation in the spring. This operation should be made near planting time so that early weeds that have germinated in the ridge before planting will be controlled.

Forming the ridges in the fall helps catch snow and provides above ground storage of water until the soil has thawed sufficiently to absorb the water which accumulated from winter rains and melting snow. A 10-inch ridge on level land will have approximately 5 inches of above ground water storage capacity. On sloping land with irregular layout, however, this storage capacity is reduced to 1½ to 2 inches of water.

The ridges are planted either with a centrally mounted planter equipped with single disk furrow openers or a trailing planter with disks to hold the planter on the ridges. The disk furrow opener cuts through any trash found in the ridge. (Stalks caught on a stub runner will scrape off the top of the ridge and reduce the height of the ridge.)

If the soil is dry the planter is run into the ridge deep enough to place the seeds in moist soil. The height of the ridge must often be reduced in order to do this. The conventional open centered press wheel has been satisfactory

for firming the soil over the seed.

After planting, the entire land surface is sprayed with $1\frac{1}{2}$ pounds of 2,4-D ester mixed with 10 gallons of water. This preemergence spray may be applied at time of planting or at any time until the corn plants emerge. Spraying after the corn has emerged will often cause serious damage to the corn plants and reduce yields. The 2,4-D provides effective weed control until the corn is about a foot high.

The annual grasses that have been stunted by the 2,4-D spray will begin to recover 4 to 6 weeks after spraying and make rapid growth. A cultivator equipped with disks should be used at about this time for the first cultivation. Because of the height of the corn this cultivation may be performed at high speeds. The disks are set to throw the soil up hill onto the ridge and are staggered for better weed control. A second cultivation may be necessary, depending on the extent of weed infestation. If used, the front disks are moved further apart in order to prevent root pruning. For all cultivations sweeps are used in the furrows to plow out tractor wheel tracks and loosen the soil for maximum water infiltration.

Physical and chemical measurements were made of the soil and the root bed of ridge farmed corn. These measurements were compared to flat planted, and lister planted corn. The temperature at seed depth at planting time

Ridge plowing with 4-bottom plow that has the 2 center bottoms removed.

A four-row, variable width ridge making unit used on sloping land.

was found to be slightly higher in the ridge than on the flat surface and from 3° to 6°F higher than in the lister furrow. The moisture content of the ridge was found to be less than flat planted or listed corn at the seed level; however, at greater depths the ridge had a higher moisture content than either the flat surface or lister furrow. The bulk density of ridge and lister furrows were approximately the same throughout the soil profile. The traveled furrows between ridges were found to be much higher in bulk density than that of the lister furrows or untraveled furrows. The available nitrate content of uncultivated soil samples was higher from the ridge than from the flat surface or the lister furrows.

Observations were made on the differences between the infiltration capacity of traveled and untraveled furrows. Wide front end tractors were used in the farming operations. Although water may flow horizontally from a compacted furrow to an uncompacted furrow and in that manner flow into the soil, the fact still remains that the only water loss from the ridged field was lost from the traveled furrows. This plot was compared with an adjacent flat planted plot. While no water was found standing in the sloping flat planted field, three areas were found where erosion had occurred. The erosion had washed out numerous hills of corn, reducing the stand and carrying soil from the field.

Another benefit is gained from the efficiency

of tractors operating on graded or contour rows. Operating the tractor on the contour permits maximum loading of the tractor in that the tractor does not have to pull itself up hill and then coast, so to speak, downhill under its own weight. The ridge-furrow combination provides an accurate steering guide for machinery operations. The front wheels of the tractor tend to follow the furrows. The ridges prevent sidehill slippage of the tractor during cultivation. This minimizes the careful attention normally required for the first cultivation of contour rows and permits higher operation speeds in later cultivation. Often it has been observed that good emergence has been secured on contour flat planted slopes; yet, the difficulty of steering on loose soil on sidehills has resulted in the plowing out of many corn seedlings.

Making the ridges with the disk cultivator or plow permits the accumulation of topsoil in the seedbed. This is especially beneficial in thin land.

Disk cultivator set to cultivate ridge farmed corn.

On level poorly drained land the elevated seedbed of the ridge provides a certain amount of protection against drowning of the crop during flooded conditions. Furrows opening into drainage ways provide a drainage ditch 4 to 5 inches below the normal soil surface. Drainage problems occur most often in soil depressions or on relatively flat land. Ridges located on the sides of a low area prevent accumulation of excess water in this depressions by preventing water from flowing into the depressions. On level land the height of the seedbed helps to avoid drown outs because, even if the land is flooded, the period of drowning is reduced because the top of the ridge emerges first after the water recedes. The reduction of the drowning period prevented drowning of ridge planted crops during the 1951 and 1954 crop years.

In a number of sloping fields, however, overtopping of the ridges during heavy rainstorms was observed. In areas where back slope occurred, the water accumulated in the furrow until water began to run over the top of the ridge into the next lower furrow. This overtopping occurred successively downslope, causing the eventual failure and washout of a number of ridges. The soil washed from a ridge was found deposited in the next lower furrows. The ridges successively failed downslope until a furrow or a number of furrows were reached that had good drainage to a waterway. When these furrows were reached, the water flowed to the waterway and failure of the entire slope was prevented.

Experience has indicated that the ends of the row should be turned downslope to provide drainage of the furrows into the waterway. If the furrows are not turned downslope then when the ridge forming equipment is pulled out of the ground, a pocket is formed which prevents drainage of the furrow during heavy rains.

During the development of the ridge farming system, yield data were collected. In general, the yield of ridged and flat plots have been approximately the same. There was a greater difference in yield during the first years of development than in later years. In some areas where listing is recommended, the yields of ridged and listed corn have been approximately the same. Where listing is not adapted, however, yields of listed corn have been below yields of ridge planted corn.

SOIL STEWARDSHIP.—Reports from Alabama show that 499 sermons were preached on soil stewardship during Soil Stewardship Sunday in 1955, with an approximate attendance of 46,049 people. In addition, numerous news articles were published and radio broadcasts presented.

Grass More Profitable Than Corn

By JOSEPH F. JELINEK

"IN a couple of years I won't be planting any corn on my farm. I plan to seed most of my farm to native grasses." This is the statement of Harold Hummel, a southern Nebraska farmer who owns a half-section of moderately rolling upland in a traditional corn and wheat producing area.

He signed up as a cooperator of the Jefferson County Soil Conservation District in 1946, and became interested in planting switchgrass after the Soil Conservation Service conservationist urged him to try to raise some. He began by planting 7 acres of Nebraska 28 (certified strain) in May 1949.

The grass was rather slow in getting started, but he cut his first seed crop in 1950, harvesting 100 pounds to the acre. His yields continued to improve and in 1953, his yield was 523 pounds. His average yield for 5 years (1950-54) was 293 pounds per acre. He sold most of this grass seed for about $1 per pound. His yield in 1955 was cut to 100 pounds per acre when the area received only about half of normal rainfall.

Harold now has 40 acres of switchgrass and 6 acres of Indian grass. He plans to plant 10 more acres of certified Kaw bluestem and 10 acres of Elreno side-oats grama.

Hummel plants his grass in 40-inch contoured rows on terraced fields. He uses a grain drill for seeding by plugging some of the holes.

Curing the native grass seed is an important step in being a successful seed producer, he says. Harold built his own seed dryer in his machine shed. The dryer has a 10-ton capacity.

Besides being a successful native grass producer, Hummel has applied a conservation plan to his farm which is complete in almost every detail. He has constructed approximately 10 miles of terraces and seeded 15 acres of waterways to grass. Two farm ponds have been constructed.

In his opinion, mechanical practices must be supplemented by good farming and soil conserving rotations. The tilth of the soil is important for proper water penetration. Through the use of legumes, commercial fertilizers, and plowing back the residues from each crop, his soil is highly fertile and permeable.

Heavy rains do not cause Hummel much anxiety. During the last 3 years the runoff has been almost negligible. Actual physical proof of this statement is visible by examining the farm pond he built in his wildlife area. The pond was constructed in 1947 with a drainage area of approximately 60 acres of cropland. Hummel said that without land treatment the pond had plenty of water in it. He has observed that as he builds more terraces and improves the tilth of the land, he notices less and less

Switchgrass and Indian grass plantings on the Hummel farm.

Note.—The author is soil conservation aid, Soil Conservation Service, Fairbury, Nebr.

Harold Hummel viewing a wildlife planting of redcedar on his farm.

runoff. The ordinary 2- or 3-inch rains on his place result in hardly any runoff. Siltation has been reduced to the point where there is almost none. The pond is dry at present, and Hummel doesn't expect any water in it unless exceptionally heavy rains occur.

Considerable irrigation activity has been started in the western edge of Jefferson County. Harold became interested after examining the ground water survey map with Marvin Hollingshead, SCS work unit conservationist. The survey showed favorable conditions, so a well was put down. A good well was obtained, delivering about 1,200 gallons per minute. Land leveling was done last fall and a contour-row irrigation system was established.

"I am going to be shooting for 500 pounds of switchgrass per acre," comments Harold. "With a dependable water supply and fertilizing, I shouldn't have any trouble making it."

The farm also has an excellent wildlife area covering approximately 4 acres. This was established in 1947. Improving wildlife habitat is the best way to increase the game population in this area," he says. "I know it is true since I have observed the results on my own farm."

Harold has served for 5 years on the Nebraska State Game Commission. He has been interested in improving the habitats over the State and is a strong supporter of watershed programs. He strongly favors establishing wildlife habitats, wherever feasible and practical, around the immediate areas of the dams built in watershed protection programs.

He will retire from the commission this spring as required by law. The winter issue of *Outdoor Nebraska*, official publication of the Nebraska Game, Forestation, and Parks Commission, paid him this tribute. "Harold Hummel, the immediate past chairman of the commission, as well as the outgoing commissioner this year, qualified well under the new law. Mr. Hummel not only lives on his own farm, but—as proven by his Master Farmer awards and other recognitions—practices all the newer methods of soil and wildlife conservation. Mr. Hummel brought to his official commission work this spirit of developing farmer cooperation in assisting wildlife management programs on the farms of Nebraska."

FARM SAFETY WEEK.—The 13th National Farm Safety Week will be July 22-28, 1956. Sponsors are: The National Safety Council, the U. S. Department of Agriculture, and other cooperating State and local agencies. The principal slogan is, "Safety Pays All Ways."

Water for Thirsty Azaleas and Camellias

By JAMES E. McDONALD

IF you had 300,000 thirsty azalea and camellia plants and only a 2-day supply of irrigation water, what would you do? Norwood Hastie, owner of Magnolia Gardens, near Charleston, S. C., found himself in this predicament during recent droughts. For the first time in the 200 years of the Gardens' existence, the irrigation ponds were almost dry.

In this emergency, Hastie called on Soil Conservation Service technicians in the Charleston County Soil Conservation District for help. Within a few hours, his water needs and potential water supply were investigated by the local SCS soil scientist and engineer. Two plans were devised: one for his immediate needs, the other for his future water requirements.

The solution to his emergency problem could have come from Ripley's "Believe It or Not." Heavily traveled State Highway 61 separates Magnolia Gardens and the woodlands of a lumber company. About the turn of the century the woodland area had been clean cut and turned upside down for the digging of phosphate rock. High, wide, and mile-long windrows of earth were left. Long, deep, narrow ponds formed between the windrows. Over the years trees reseeded in the area, but the ponds are still there. Despite the drought they contained a

Note.—The author is soil scientist, Soil Conservation Service, Charleston, S. C.

Irrigation of young camellia plants at Magnolia Gardens.

Water being pumped from seepage ditch (above) into irrigation storage pond (right).

few feet of water. An emergency supply of water was thus found; but problems piled up. Could the water be used? How to get it across the highway and into Magnolia's ponds? Where to get extra irrigation pipe and a pump?

Putting first things first, Hastie called the main office of the lumber company, a hundred miles away, and obtained permission to use the water. Next he obtained permission from the State Highway Department to trench the busy highway, lay and cover a 4-inch conduit pipe, and keep traffic rolling, all in the space of a few hours.

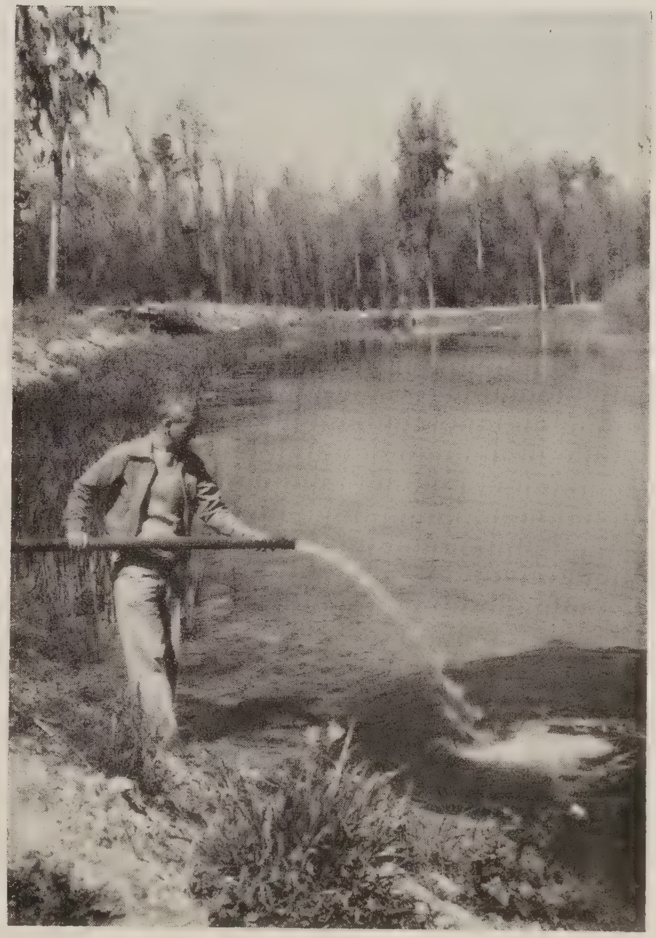
Meanwhile, 1,500 feet of irrigation pipe and a high capacity pump were needed to pull the water up out of the woods' ponds and pump it to a ditch that ran into Hastie's nearest pond. Another call, this time to Newman Buck, chairman of the Charleston County Soil Conservation District, and owner and operator of a large vegetable and cattle farm, 16 miles away. Buck had the pipe and a pump. Within a few hours, piled high on a truck, pipe and pump were on the way to Magnolia Gardens.

By now the sun was setting and only 1 day's supply of water was left. Work continued on into the night to beat the sunup deadline and get water to the valuable plants before Old Sol could further wilt and cook them.

After many hours of hard work everything was ready. The motor was cranked up, splitting the silence of the woods with a mighty roar. The suction pipe shook and took hold, water sucked up through the pipe, under the road, and raced to the ditch and into the pond.

As the water level rose the Magnolia Gardens' pumps started and the life-giving waters rained down on the thirsty plants. The deadline had been met and the emergency was temporarily over.

But plan two still remained to be carried out. Magnolia Gardens needed a permanent long-time supply of water. The SCS soil scientist and engineer made borings by hand and power



Scenic view on Magnolia Gardens.

auger in several areas in an attempt to locate an underground strata of water-bearing sand. The results were discouraging, only thick layers of clay and soft marl could be found.

One area at the base of a clay slope showed promise. Borings struck a sand layer that yielded some seepage water. A chance had to be taken, so a deep seepage ditch was dug by dragline along the base of the slope. Slowly the water seeped out and ran down the ditch to a sump hole. Each morning, often before sunup, the precious water was pumped to a small pond and doled out to the ever thirsty plants.

When the seepage ditch was finished the dragline began digging a storage pond in a low clay area of the Gardens. Ordinarily the area would be covered with 2 feet of water but now it was bone dry clear down to the bottom of the 8-foot hole. As the hot, dry summer wore on, every bit of extra water was pumped into the new pond. By winter, aided by Hurricane Hazel, the pond was full.

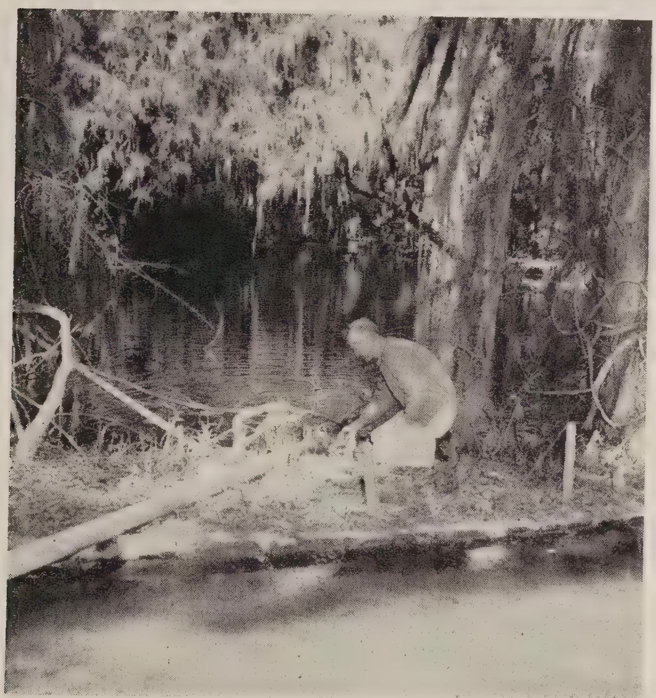
Meanwhile, Hastie put down a 700-foot test well in a search for more water. The log indicated a vein of water at about 400 feet but a salinity test showed it to have 880 parts per million of salt, making it unfit for irrigating the tender plants. So the test hole had to be abandoned.

More recently, the 200-year-old ponds were deepened and drainage ditches opened up to lead any runoff from the land into the ponds. Outlets to the Ashley River, a salt water river, were blocked so that no water could escape from the land. Rainfall, more than in the previous year, but still not up to normal, was held in the soil by mulching practices. Seepage was caught and stored in the ponds.

By observing and checking the salt content of the high flows in the salty Ashley River, Hastie found that heavy rains upstream some-

times lower the salt content of the river. This occurs when high flows of fresh water from heavy rains flow by Magnolia Gardens on the low ebb tide of the river. When the salt content is low enough, he pumps water out of the river into his ponds. Using the river water is a risk he is willing to take to get irrigation water.

Magnolia Gardens has not completely solved its water problems but, with the aid of the Soil Conservation Service technicians in the Charleston County Soil Conservation District, emergency problems have been met and partial long-time needs solved.



A pond on Magnolia Gardens into which water is pumped from Ashley River during low tide.

PROFIT IN TREES.—W. E. Barlow of Bluff City, Ark., planted 4 acres to pine seedlings in 1942. At the time of planting Barlow stated the land was worth about $5 per acre. After 12 growing seasons, in 1954, the area was spotted for the first thinning. Barlow did his own work and netted $60 per acre from this area, and says now he would not sell the land for $100 per acre.

W. M. Glass of Route 6, Prescott, Ark., planted 5 acres of pine seedlings in 1942. After 11 growing seasons, in 1953 he made his first thinning. Glass did his own cutting and averaged $50 per acre on the thinning.

DISTRICT PROFILE — KENNETH CONRAD of COLORADO

GOOD grass and good cattle to make use of it are Kenneth Conrad's ideas of successful ranch operation. Because of his enthusiasm in promoting these principles, as well as applying them on his own ranch, Conrad's name has become widely associated with good range management and soil conservation.

Kenny purchased a ranch in the sandhills northwest of Wray, Colo., in 1943. Several smaller units that were mainly devoted to dryland farming were purchased later to block out the ranch, which now takes in about 14,000 acres. Marvin Kniese, a graduate of Colorado Agricultural College, was employed as ranch manager and he and Conrad began a program of range and livestock improvement. Kniese is now operating a ranch of his own east of Wray.

In 1951, the ranch was added, by petition, to the Northeast Yuma Soil Conservation District and a conservation plan was developed. A great deal of native range improvement was already underway at that time and some reseeding of abandoned cropland had been done.

Much of the cultivated land had been severely eroded by wind. An extensive reseeding program was put into effect. More than 1,100 acres have since been seeded to grass and grass-legume mixtures. None of the land is now cultivated. Over 600 acres have been planted to sand lovegrass—most of it in a mixture with sweetclover and alfalfa. Smaller acreages are planted to side-oats grama, Blackwell switchgrass, and native bluestem. Cool season grasses with alfalfa were used in the latest seedings which include intermediate wheatgrass, tall wheatgrass, and smooth brome. Good stands are established on most of the seeded area and they make up a valuable part of the grazing capacity of the ranch.

Seasonal use of native range has been rotated over the ranch to give each pasture as much rest as possible during the growing season. This has brought about a marked increase in the tall

Kenny Conrad.

sandhill grasses and a much higher production of forage. The past few years have been dry but grass production on the ranch has held up remarkably well. Kenny's slogan in regulating use of pastures is, "Watch the grass and watch the cattle." A flexible operation is followed so that cattle do not remain on any pasture until the grass is overused.

An intensive breeding program has been followed, along with the range improvement, in an effort to get the highest sustained production of beef per acre and cow unit. Individual production records are kept on the cow herd.

Conrad has served on the board of supervisors of the Northeast Yuma Soil Conservation District for 3 years and is now president of the board. He has been a national director of the American Society of Range Management, in which he has been active for several years. He is active in the Yuma County Livestock Association and has served as president of that organization. In 1954 he was instrumental in organizing a "grass school" for ranchers in Yuma County and surrounding areas which was well attended.

The Conrad ranch was one of three places entered by the Northeast Yuma Soil Conservation District in the Denver Post-KLZ Soil Conservation Contest in 1952. The district was state winner that year and the Conrad ranch received the highest rating of any individual unit.

Kenny is a native of Yuma County, his father being an early settler. He and his wife have three boys, Joe, the oldest, is attending Colorado Agricultural College, and Mike and Chris are in high school at Wray.

—T. E. MULLINGS

Trees For Eroded Land

By CLARENCE L. DANIELS

A group of 67 Negro farmers got away to a fast start in the Johnson Creek watershed in Tennessee. The watershed work plan had been completed, but federal funds for structural work were not yet available. They didn't wait for the Federal Government to take the initiative.

Note.—The author is work unit conservationist, Soil Conservation Service, Jackson, Tenn.

Handy Reid receiving pine seedlings for planting on his farm from C. E. Burger and B. F. Headden of the Soil Conservation Service.

Planting pine trees on gullied land in the Johnson Creek watershed.

The group planted 150,000 pine trees last season on 150 acres of gullied land in the upper part of the watershed as one of the first phases of the 5-year program planned by the supervisors of the Madison County Soil Conservation District and the directors of the Johnson Creek Watershed District. Altogether there are 1,657 acres of gullied land that need to be planted to pines.

Knowing the economic condition of the group and the severely eroded condition of their area, the supervisors decided to develop a special program to fit their needs and desires. They asked the ASC County Committee to give special financial assistance for a tree-planting program in the area through the Agricultural Conservation Program.

During the discussion, it was brought out that very little, if any, ACP money had been earned in the past by farmers in this area. The county committee became interested and allotted $1,500 of regular ACP money for planting pines in the watershed. Meanwhile James F. Hughes, SCS technician working with the group, had laid the groundwork by explaining the watershed program and the plan the supervisors had in mind.

The supervisors told the group that they would buy the trees at $3 a thousand and deliver them to cooperators' farms. Then when the trees had been properly planted, the supervisors would pay them $7 a thousand. In so doing, $10 was spent for each acre of gullies planted to pines. This was the full ACP payment. In return, the cooperators participating assigned the ACP payment to the supervisors through a pooling agreement.

Cleo Reed receives a check from K. J. Johnson, soil conservation district supervisor, for having planted several thousand pine seedlings on his gullied land, while his neighbors look on.

When everyone agreed to the supervisors' proposition, the plan was put into operation. Supervisors borrowed the needed $1,500 from the Production Credit Association to finance the deal.

Another need on the low-income farms of the 22,610-acre watershed is winter cover for corn and cottonfields. The district encouraged the farmers to pool their resources to solve this problem. And last summer, 20 of these cooperators pooled land, labor, and money to sow 30 acres of oats and vetch for seed production. When the crop is combined this summer, seed will be divided equally among the 20 farmers. They in turn will plant the seed and combine a part of the seed produced on individual farms.

Everyone concerned feels good about the start made by these farmers with the help and encouragement of others. And here's why: (1) some 150 acres of gullies have been set to trees, (2) these low income farmers earned $1,050 for labor during the winter months when most of them were not working, (3) the people now have a much better understanding of the purpose of the Agricultural Conservation Program and know how to use it, (4) the people now know that the supervisors want to help them and they will cooperate much better with future programs, and (5) the supervisors and technicians are encouraged and now realize that a long-range program will be of great help to these people and that true conservation farming can be achieved.

Range Pitter Gets Results

By C. S. FONTE

THE dry seasons of the past 5 years in eastern Colorado have caused a sharp decline in range condition and forced many ranchers to take a critical look at their rangelands and search for measures to relieve this condition. Some ranchers have recognized their problems and are trying to do something about them. One such case involves ranchers of the Central Colorado Soil Conservation District.

Realizing that much of their rangeland was in fair to poor condition, they knew that when it did rain they lost most of the moisture that fell. They found that on the poor ranges the surface of the soil was sealed over and turned water as if it were the roof of a house. It would take several minutes after moisture was applied to the surface of the soil before it would soften up and take moisture. Then a more enlightening fact was discovered. After the surface was softened up, water still penetrated into the soil very slowly. On many soils, 8 to 12 inches below the surface, there was a parallel platy condition that kept the water from penetrating deeper into the soil. This was on medium and heavy textured soils. Neither the platy condition nor the sealing over of the surface was found on sandy soils. Therefore, sandy soils did not present the problem of getting moisture into the soil. In an effort to remedy these two soil conditions on poor and fair range

Pitting is more effective if done on the contour, especially if the slope is 5 percent or more.

Note.—The author is range conservationist, Soil Conservation Service, Colorado Springs, Colo.

Range pitting machine.

conditions of the medium and heavy soil textures, the ranchers of the Central Colorado Soil Conservation District procured a machine called a range pitter. This is a custom made machine that consists of a steel drum 8 feet in length and 3 feet in diameter with 15 teeth, 3 rows with 5 teeth in each row. It is a large machine made entirely of metal and weighs approximately 5 tons. The teeth are 14 inches long and 4 inches wide. A large farm tractor is needed to pull this machine. The machine does a better job of breaking up the hardpan (platy condition of soil in top 8 to 14 inches) when operated at a rate of 4 miles per hour. The machine makes more than 5,000 pits to the acre. Most pits will fill to the surface of the ground with 3½ gallons of water; however, some will take as much as 5 gallons to bring the water to the ground level.

It is more effective to operate the machine on the approximate contour for two reasons: first, the machine, weighing 5 tons, takes less power to pull on the contour than up and downhill; secondly, the pits made on the level are more effective since the length of 8 to 10 inches is across the slope rather than the width of 3 to 4 inches.

In measuring the effect of this pitting on a one season basis, it was found that on a clay loam soil which was treated by this machine, moisture penetrated to a depth of 19 inches from a 2.5 inch rain as compared to 7 inch penetration on an untreated area. The effect of keeping this moisture on the land is reflected in increased growth of vegetation. On these clay loam soils with a fair stand of grass, the production was increased from 500 pounds per acre on the untreated area to 1,000 pounds per acre on the treated portion. This was accomplished with a little less than normal rainfall following 4 years of drought. There was 3.18 inches of rain in the 4-month growing season. Species of grass were galletta, blue grama, three-awn, and western wheatgrass.

On not quite as heavy a soil with nearly a pure stand of blue grama, the effect was not so great. The untreated area yielded 400 pounds per acre while the pitted area yielded 500 pounds per acre—only 100 pounds more. These production weights are all in the same local area of rainfall.

In this same area with practically no vegetative cover, only scattered blue grama plants of low vigor, there was only slight effect on the

grama plants. But a good stand of annual weeds was produced that will hold snow and help prevent wind erosion through the winter and spring months.

The ranchers who have used this machine are very pleased with the results that have been obtained in one season's operation. There are a few suggestions on which all concerned are in agreement:

(1) Use the machine only on soils of loam or heavier texture.
(2) Do the pitting on the contour.
(3) Use the machine only on range in fair or poor condition.
(4) Since moisture penetration is generally satisfactory on good and excellent condition range, pitting is not necessary.
(5) The effect of pitting on silty clay loam soil may be short-lived due to the fact the pits will silt up and seal over and become less effective.

Other methods of range treatment such as chiseling, contour furrowing, and pitting with eccentric one way disk have been used in the area. There has been some success with each of these treatments in this area as well as in other areas. The main objection to these treatments is that they do not satisfactorily treat the so-called hardpan which slows up the recovery of range. However, as shown by Barnes in a 10-year study in Wyoming, pitted areas (eccentric disk) produced 9 pounds more of lamb per area than untreated areas and also carried 22 percent more sheep.

This increase of production in Wyoming was made during a more favorable climatic period than at present. However, the ranchers of the Central Colorado Soil Conservation District recognize this situation, and are moving forward as indicated by their progress of pitting about 6,000 acres in 1955 with plans for an equal or greater acreage in 1956.

ARBOR DAY IN NEBRASKA.—Some 18,000 trees were planted by fifth-grade pupils in Nebraska on Arbor Day, April 22. As a project of the Nebraska Junior Chamber of Commerce, each pupil planted two trees, each carrying a metal tag giving the name of the pupil who planted the tree. Merchants and businessmen in the town where the trees were planted will pay the cost of this project. A prize will be awarded to the school with the highest survival rate of trees at the end of 1 year.

CONSERVATION RANCHING IN NEW MEXICO

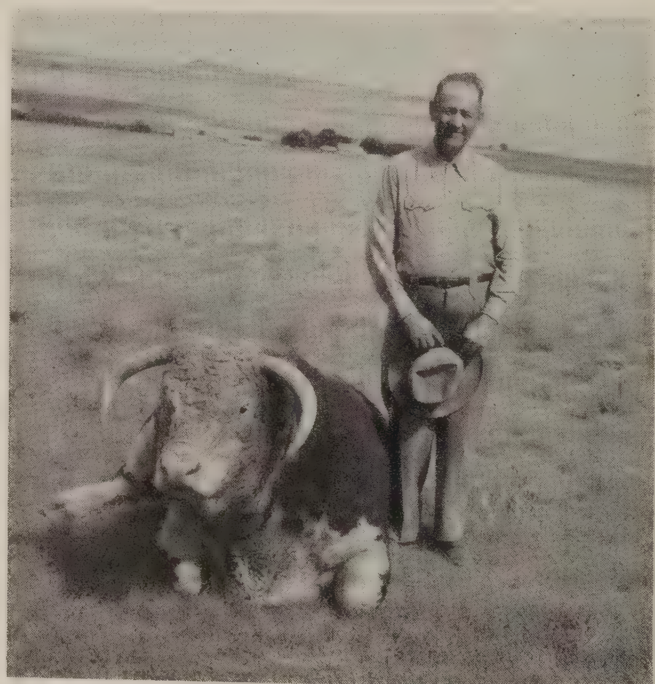
By RALPH G. MILLER

"PROPER land use and good soil and water conservation practices have gone a long way toward making the business of ranching a success," declares E. E. Salyer, Colfax County, New Mex., rancher.

The Salyers, who came from Texas, homesteaded 320 acres in the Malpie community in 1911. They made their living largely from dryland farming until the early thirties. In 1914, Salyer established the Malpie post office and store. At that time, about 75 farmers lived in the community. Most of them made a living by cultivating about 100 acres of dry cropland, using horse and mule power.

During the thirties and early forties, the Salyers enlarged their land holdings to the present 5,000 acres of rangeland and 500 acres of dry cropland. A large measure of their success can be attributed to conservation.

Note.—The author is work unit conservationist, Soil Conservation Service, Raton, New Mex.



E. E. Salyer and one of his herd bulls.

A large pond on the Salyer ranch with windmills to pump water for livestock and garden irrigation.

They have consistently followed a system of stocking according to the capabilities of the range and reducing or fluctuating livestock numbers in dry years.

For the last 14 years they have followed the practice of range deferment on one of the pastures by excluding all livestock during the summer growing season. This pasture is used only by cows with calves during the spring calving season, thus providing a strong fully matured range feed at this time of important cattle management operations. The average calf weights for 1954, one of the driest years on record, were about 410 pounds for calves 6½ to 7 months old.

By paying attention to proper use of range forage and proper stocking, the Salyers have improved and maintained a good range, even during the recent severe droughts. On the "mountain pasture" of the ranch there now is a mixture of the better varieties of forage grasses, such as western wheat, big bluestem, little bluestem, Indian grass, Arizona fescue, mountain muhly, pine dropseed, and blue grama. About 80 percent of the pasture is made up of these good or desirable grasses. These species are not only highly desirable for forage production and soil conservation, but are the most efficient users of rainfall and snowfall.

The vigor of these better grasses is high as the growth pattern of individual grass plants is bunchy. In carrying out his soil and water conservation plan Sayler built or improved 11 stock water ponds. Some of the ponds were formed by new dams and others were improved by enlarging. Several wells were also drilled for livestock water. This combination of stock water dams and wells has done much to improve the distribution of cattle on the range.

Two and three-fourths miles of stock trails have been constructed to make grazing more accessible to the rougher parts of the mountain pastures.

About 2½ miles of erosion control ditches and dikes have been constructed for control of runoff and spreading of floods on natural grasslands. Two miles of terraces have been constructed on dry croplands to conserve water and control water erosion.

Crop residues have been maintained on dry cropland during the winter and spring blow seasons, where possible. In dry years, when inadequate crop residues were produced, dry croplands were emergency tilled or chiseled to prevent wind erosion. Damage to cropland by wind erosion was kept to a minimum.

An erosion control dam constructed at the head of a vega, or key grazing area, has protected this area against erosion and siltation. Floodwaters here were controlled so that they could be spread over the vega.

One farm fishpond has been developed.

About 1 acre of trees for a farm windbreak has been established.

In addition to the above practices, it is planned to seed to native range grasses some of the dry croplands that are unsuitable for continued cultivation. Several hundred acres of abandoned croplands now used as rangelands have been range pitted or chiseled for improvement of moisture infiltration.

Deferred grazing, as shown at the left, greatly increased forage production on the Salyer ranch.

Salyer has served on the State Soil Conservation Committee of New Mexico for a number of years, and at one time was chairman of that committee. He has also been on the board of supervisors of the Eastern Colfax Soil Conservation District for the past 5 years.

REVIEWS

FARM SOILS: THEIR FERTILIZATION AND MANAGEMENT. By Edmund L. Worthen and Samuel R. Aldrich. 5th edition. 439 pp. Illustrated. 1956. New York: John Wiley & Sons, Inc. $4.96.

This is an excellent book. The authors deal with both the principles and practices of soil management in simple terms for students and farmers who may have had no previous experience in either chemistry or soil science. Technical terms are held to an amazingly low minimum for so accurate a book. It explains the principal characteristics and qualities of soil that determine their responses to different practices and combinations of practices for efficient, sustained crop production. Although a 5th edition under a well known title, this is essentially a new book and considerably better than its predecessors.

The book deals primarily with the soil management practices and systems for the humid, temperate northeastern one-quarter of the United States, roughly east of the Great plains and north of the cotton line. It will we useful but less specific for those living in other parts of the United States.

This reviewer likes the balanced discussions of practical soil management practices and of the principles that underlie them. Soil conservation is conceived as an integral part of the soil management system for a field or farm. The reasons for the basic differences among the different kinds of soil are explained and related to a discussion of practices.

The book is well illustrated and contains useful suggestions to the high school teachers for field studies, including special soil judging schools and farm selection. Besides being useful as a text in high schools or in more advanced schools where practical soil science is scheduled before chemistry, the book will be useful for farmers and others. It is a good refresher book for those who have studied chemistry and soil science a long time ago with few opportunities "to keep up" with these subjects since.

—CHARLES E. KELLOGG

AWARDS FOR MERITORIOUS SERVICE

By ROSS D. DAVIES

A JOINT project in South Dakota of the State Soil Conservation Committee and State Association Soil Conservation Districts board of directors has met with initial success this year. These two groups worked out a plan of certificates of award for meritorious service to soil conservation district supervisors.

These certificates are awarded on recommendation by local boards of supervisors to district supervisors who have faithfully served their district over a period of years. The plan provides a green seal on the certificate for a minimum of 6 years' service, a red seal for 12 years, and a gold seal for 18 years' service.

It is more than just a length of service award. The inscription on the certificate reads:

"Certificate of Award—Presented to .... Name .... In Appreciation of Public Spirited Service to His Community, State and the Nation as a Supervisor of the .... Name .... Soil Conservation District During the Period ....19.... to ....19.....”

Each certificate carries three signatures. It is signed by the chairman, State Soil Conservation Committee; chairman, State Association Soil Conservation Districts; and chairman, local Soil Conservation District.

The record as of April 1, 1956 shows 5 gold seal, 59 red seal, and 135 green seal certificates have been awarded. They have usually been framed and presented at some public function. Many were presented at annual district cooperator banquets or meetings and served as a valuable basis for discussing the district program and furthering district objectives.

Note.—The author is state conservationist, Soil Conservation Service, Huron, S. Dak.

Three supervisors of the Clearfield-Keyapaha Soil Conservation District, S. Dak., with their 18-year certificates of award. They are: (left to right) Clyde H. Sargent, Dennis B. Lyons, and Walter C. Hellman.

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OFFICIAL BUSINESS

Three of the first five supervisors to receive 18-year awards were from one district, the Clearfield-Keyapaha Soil Conservation District. These three men—Clyde H. Sargent, Winner; Dennis B. Lyons and Walter C. Hellman, both of Millboro, received their certificates at a public recognition meeting at Winner on April 2, 1956.

Another 18-year certificate winner is Joseph Heimer, Dupree, a supervisor in the Tri-County District at Faith. The late Frank Feser of the Brown-Marshall Soil Conservation District, Hecla, was the other recipient of an 18-year certificate. When the certificate was presented to him a few days before he passed away on January 19, he stated: "This certificate means more than most any honor I have ever received because it shows that I have tried to help my district."

CONSERVATION PAYS.—A survey of farms in the Coon Creek watershed of western Wisconsin, site of the first erosion control demonstration project in the United States, by H. O. Anderson and P. E. McNall, University of Wisconsin farm management specialists, proves that conservation is profitable.

Since the erosion control program began in 1933, almost half of the farmers of LaCrosse, Vernon, and Monroe counties have adopted soil conservation practices, according to Anderson and McNall.

There were about 3,600 farmers in the program at the end of 1954. This is an increase from 200 farmers who pioneered the Coon Creek watershed project in 1934. Many of the farms not actively under the soil conservation program have also joined in conservation practices, the agricultural economists say.

Anderson and McNall found that some soil conservation practices have been more readily adopted than others. Contour stripcropping and terraces have been taken up faster than all other practices. This, according to the farm management specialists, is because these practices fit best into the farmers normal production program.

About 85 percent of participating farmers grow legume hay compared to 75 percent of all farmers in the area.

For this study, Anderson and McNall classified conservation program farms into three categories—high score, medium score, and low score conservation farms according to the number of practices adopted. They compared production and income of the high and low farms to show the effect of conservation.

Corn and oat yields were 21 percent higher on the high conservation farms than on the low. Hay yields were 9 percent higher than on the low farms.

High conservation farms also had more livestock production. More corn and grain made possible greater production of hogs and poultry.

High conservation farms had 3 more cows per herd and sold about 800 pounds more butterfat than low farms. The high farms sold almost 600 pounds more beef, 1½ tons more pork, and 500 dozen more eggs.

Increased production brought in more money on the high conservation farms too, Anderson and McNall say. Average total cash income was 10 percent higher.

CORDWOOD FROM WILDLIFE MARSH. — Henry Erikson of West Acton, Mass., has taken advantage of the open winter to cut the cordwood off his wildlife marsh. Erikson holds the water up over this marsh in order to get a good coating of ice to aid in harvesting the cordwood. He trucks the wood off the marsh as it is cut so that there is no danger of losing it in case of a thaw or heavy snow. He seems to manage to make these land improvements in such a way that he has little or no out-of-pocket expense. The marsh has already attracted large numbers of waterfowl and should improve now that the wood has been removed. Erikson will realize enough out of his cordwood sales to pay nearly all the expense of building this marsh.

WISE SOIL MANAGEMENT NEEDED.—In early times, farmers could keep going west to mine the virgin fertility of new soils to grow more corn. But now fields are no longer the equivalent of open pasture for crops where seeds are turned out in the spring to rustle for themselves like cows on the range.

Bigger and better crops are not necessarily a matter of more and newer acres. Today's top yields are a result of wise soil management that guarantees an adequate supply and a good balance of plant nutrients.

—W. A. Albrecht
Chairman, Department of Soils
University of Missouri